UA13
.2
TM
1942

[redacted]

TM 11-238

WAR DEPARTMENT

TECHNICAL MANUAL

RADIO SETS SCR-194 AND SCR-195 AND AUXILIARY EQUIPMENT

April 17, 1942

CLASSIFICATION CANCELLED, in accordance with par. 15, AR 380-5, by authority of W.D. Circular 49, 1945.

Digitized by Google

Original from UNIVERSITY OF CALIFORNIA

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

[redacted]

*TM 11-238

TECHNICAL MANUAL
No. 11-238

WAR DEPARTMENT,
WASHINGTON, April 17, 1942.

U113
.2
TM11:238
1942

RADIO SETS SCR-194 AND SCR-195 AND AUXILIARY EQUIPMENT

		Paragraph
SECTION I.	General.	
	Purpose	1
	General description	2
	Major component parts	3
	Description of parts	4
II.	Employment.	
	Location and selection of frequencies	5
	Setting up equipment	6
	General operation	7
	Portable operation	8
	Vehicular operation	9
	Service	10
	Storage	11
III.	Detailed functioning of parts.	
	Radio set SCR-194	12
	Radio set SCR-195	13
IV.	Supplemental data and parts list.	
	Frequencies and dial settings, radio receiver and transmitter BC-222	14
	Frequencies and dial settings, radio receiver and transmitter BC-322	15
	Parts list	16
V.	Remote control equipment RC-66.	
	Purpose	17
	Setting up and connecting	18
	Operating	19
	Removing from service	20
	Detailed functioning of parts	21
	Parts list	22
VI.	Antenna equipment RC-63.	
	Purpose	23
	Setting up and connecting	24
	Operating	25
	Removing from service	26
	Parts list	27

*This manual supersedes TR 1210-52, June 19, 1939.

M558598

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

VII. Carrier FM–32 and frame FM–33. Paragraph
Purpose ---- 28
Description ---- 29
Employment ---- 30
VIII. Bag BG–82.
Purpose ---- 31
Description ---- 32
Employment ---- 33

SECTION I

GENERAL

Paragraph
Purpose ---- 1
General description ---- 2
Major component parts ---- 3
Description of parts ---- 4

1. Purpose.—Radio sets SCR–194 and SCR–195 are intended for point-to-point voice communication within the artillery battalion and infantry regiment, respectively.

2. General description.—*a.* Radio sets SCR–194 and SCR–195 are highly portable, low power, high frequency sets which include transceivers. They are used to communicate over distances up to 5 miles. All the equipment required for transmission and reception is carried on the back of the operator in a canvas bag. For vehicular operation radio set SCR–195 includes steel mast sections and a mast base with means of connection to the set to replace the telescoping tubular antenna used when the set is carried on the operator's back. Radio set SCR–194 does not include accessories for vehicular operation but antenna equipment RC–67, which comprises the vehicular antenna accessories, is furnished as a separate unit when required. Power for both transmitting and receiving is supplied by one dry battery.

b. Radio set SCR–194 has a frequency range from 27.7 to 52.2 megacycles using two oscillator coils, and affords 62 channels with 400 kilocycle separation.* Radio set SCR–195 has a frequency range from 52.8 to 65.8 megacycles using one oscillator coil, and affords 33 channels with 400 kilocycle separation (see sec. IV).

* The authorized channel separation of radio sets SCR–194 and SCR–195 has been fixed at 400 kilocycles; however, many such sets have been issued which also have a 500 kilocycle channel scale. Care must be exercised to use only the 400 kilocycle channel scales.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA



FIGURE 1.—Radio set SCR–194—component parts (less chest CH–33).

There is no operating difference between the two sets. The general design and construction are identical except that the frequency band of the SCR–194 is covered by two interchangeable coils, and the operator's equipment consists of a microphone T–24–E and

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

headset HS-22-B, whereas the frequency band of the radio set SCR-195 is covered by a single coil and there are provided two operator's handsets TS-11-E.

3. Major component parts.—*a. Radio set SCR-194* (fig. 1).—The radio set SCR-194 and associated equipment is divided into two parts for operation and transportation.

(1) For portable use the following equipment is carried in bag BG-71 on the back of the operator and constitutes a complete transmitting and receiving unit with antenna and power supply:

Quantity	Article	Weight in pounds
1	Antenna AN-29-B [1]	0. 50
1	Bag BG-71	2. 50
1	Battery BA-32	12. 00
1	Headset HS-22-B [2]	. 40
1	Microphone T-24-E [3]	1. 50
1	Radio receiver and transmitter BC-222	8. 00
1	Tube VT-33	. 10
1	Tube VT-67	. 10
		Total 25. 10

[1] Antenna AN-29 can be substituted for antenna AN-29-B, but antenna AN-29-C is not suitable for this use. (No AN-29-A has been procured.)
[2] Headset HS-22-A or HS-22-C can be substituted for headset HS-22-B.
[3] Microphone T-24-A, T-24-B, T-24-C, T-24-D or T-24-F can be substituted for microphone T-24-E.

(2) Auxiliary equipment and spare parts are carried in chest CH-33 as follows:

Quantity	Article	Weight in pounds
1	Antenna AN-29-B [1] (spare)	0. 50
2	Battery BA-32 (spare)	24. 00
1	Binding post TM-176 (spare)	. 04
1	Box BX-13	1. 60
1	Chest CH-33	28. 50
1	Cord CD-195	. 80
2	Tube VT-33 (spare)	. 20
2	Tube VT-67 (spare)	. 20
25 feet	Wire W-126 (or W-9)	. 30
		Total 56. 14

[1] Antenna AN-29 can be substituted for antenna AN-29-B, but antenna AN-29-C is not suitable for this use. (No AN-29-A has been procured.)

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

b. Radio set SCR-195 (fig. 2).—The radio set SCR-195 and its associated equipment are divided into two parts for operation and transportation.

(1) For portable use the following equipment is carried in bag BG-71 on the back of the operator and constitutes a complete transmitting and receiving unit with antenna and power supply:

(2) Auxiliary equipment necessary for vehicular operation and spare parts are carried in chest CH-33 as follows:

Quantity	Article	Weight in pounds
1	Adapter SO-52	0. 65
1	Antenna AN-30-B [1]	. 50
1	Bag BG-71	2. 50
1	Battery BA-32	12. 00
2	Handset TS-11-E [2]	3. 00
1	Radio receiver and transmitter BC-322	8. 00
1	Tube VT-33	. 10
1	Tube VT-67	. 10
	Total	26. 85

[1] Antenna AN-30 may be substituted for antenna AN-30-B. (No AN-30-A has been procured.)
[2] Handset TS-11-A, TS-11-B, TS-11-C, TS-11-D or TS-11-F can be substituted for handset TS-11-E

Quantity	Article	Weight in pounds
1	Antenna AN-30-B [1] (spare)	0. 50
2	Battery BA-32 (spare)	24. 00
2	Binding post TM-176 (1 spare)	. 04
1	Box BX-13	1. 60
1	Chest CH-33	28. 50
1	Cord CD-195	. 80
1	Mast base MP-22	6. 50
2	Mast section MS-50 (1 spare)	. 50
2	Mast section MS-51 (1 spare)	1. 00
2	Tube VT-33 (spare)	. 20
2	Tube VT-67 (spare)	. 20
25 feet	Wire W-126 (or W-9)	. 30
	Total	64. 14

[1] Antenna AN-30 can be substituted for antenna AN-30-B. (No AN-30-A has been procured.)

4. Description of parts.—*a. Radio receivers and transmitters BC-222 and BC-322* (figs. 3 to 11 incl.).—All elements of the receiver and transmitter are chassis mounted and contained in an aluminum-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

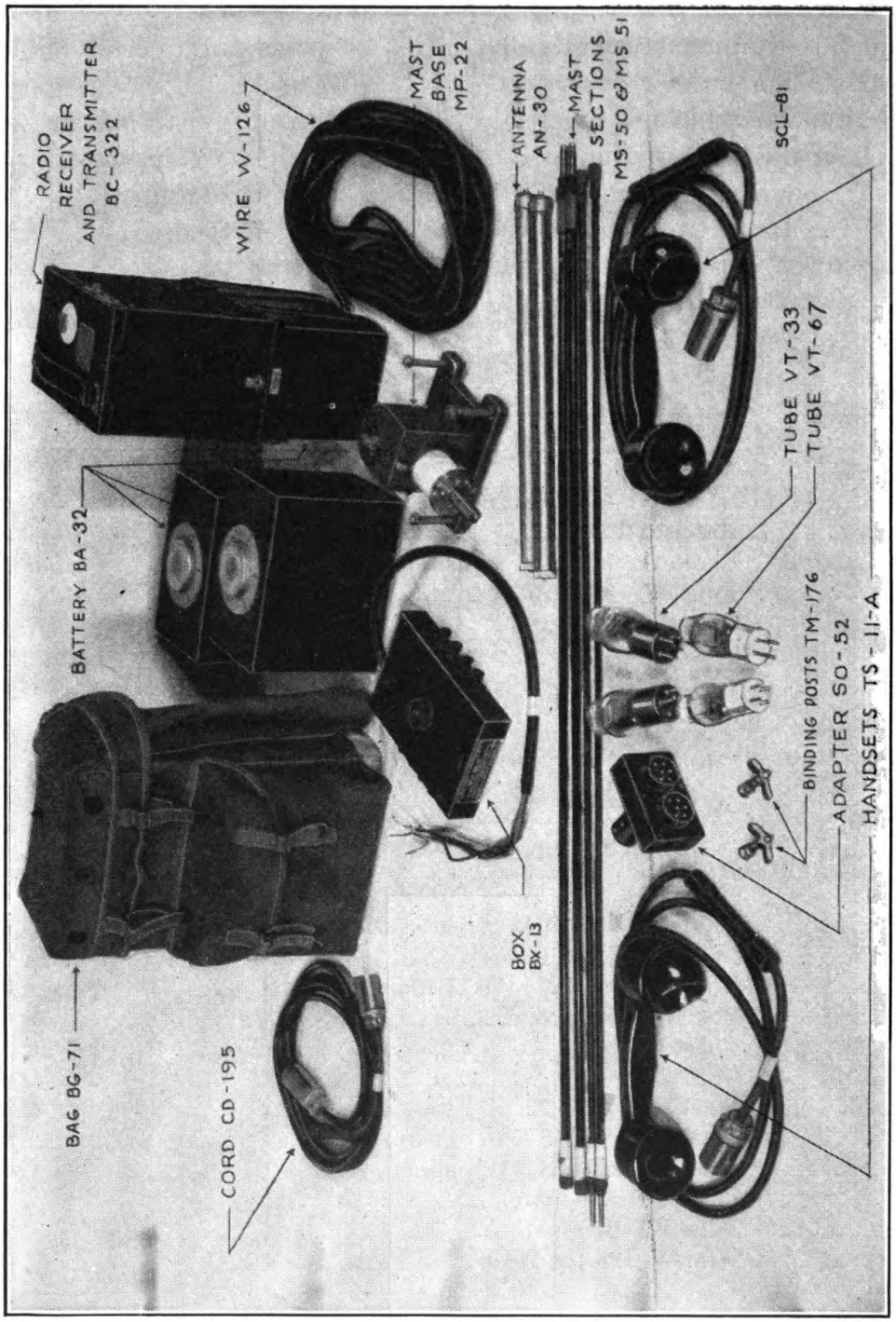


FIGURE 2.—Radio set SCR-195—component parts (less chest CH-33).

alloy case. This unit is designed to fit directly on top of a battery BA–32 from which it derives its power. The case is fitted with a carrying strap, an antenna mounting, and two straps which serve to hold the battery in place. Connection to the battery is completed through a plug in the bottom of the chassis and a socket in the top of the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

battery. Access to the top of the chassis may be gained by releasing the snap slides at the sides and opening the cover. Tubes and tuning coils may then be installed or removed. Latest procurements of radio sets SCR–194 and SCR–195 have devices added to provide additional support for the tubes. These consist of an insulating cap mounted on the inside of the top cover, and a spring clamp mounted on the chassis. The cap fits over the tube VT–67 when the cover is closed, and the spring clamp fits around the base of the tube VT–33. To remove the tube VT–33 from the clamp, the lever on the side of

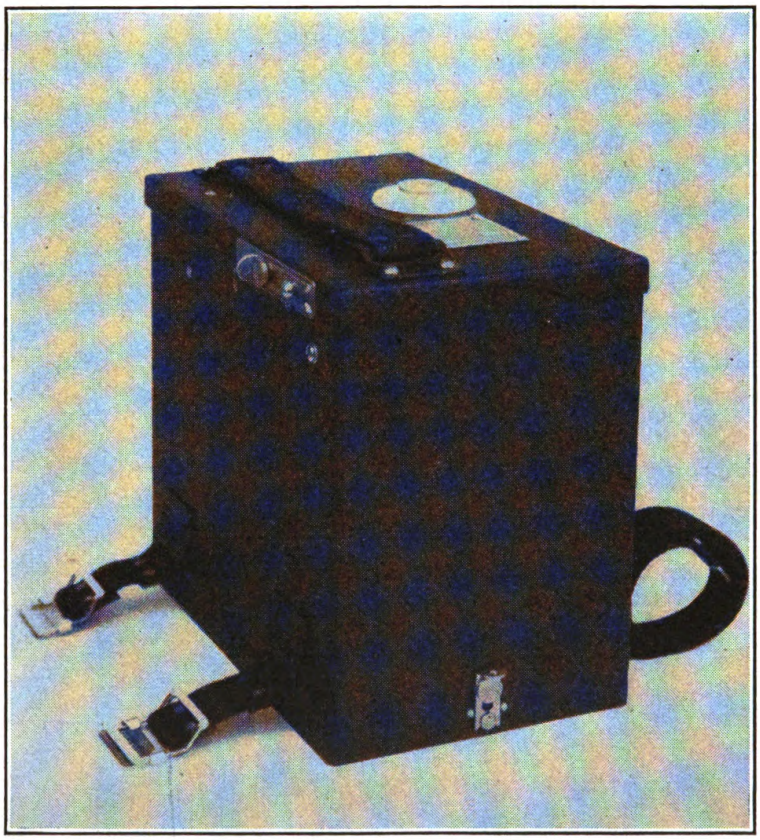


FIGURE 3.—Radio receiver and transmitter BC–222, exterior view showing carrying and battery straps and antenna mounting.

the clamp is pressed with a pencil, screw driver, or similar object. The chassis may be removed to facilitate inspection or repair by opening the front cover and taking out three screws, one at either side of the case and one in the rear. The receiver and transmitter unit, except for a few minor items, employs the same elements for both receiving and transmitting. The operation of various elements is changed from receiving to transmitting by alternate connections effected by the relay BK–10, which is in turn controlled by the switch

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

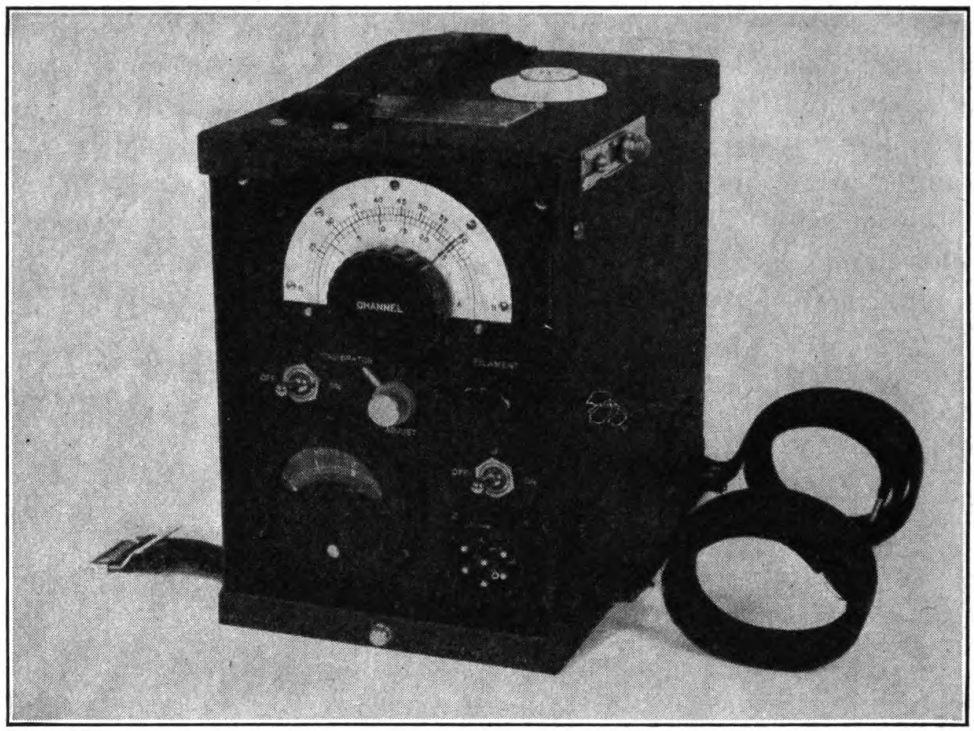


FIGURE 4.—Radio receiver and transmitter BC–222, front cover removed showing dial scale with 400 kc subdivisions.

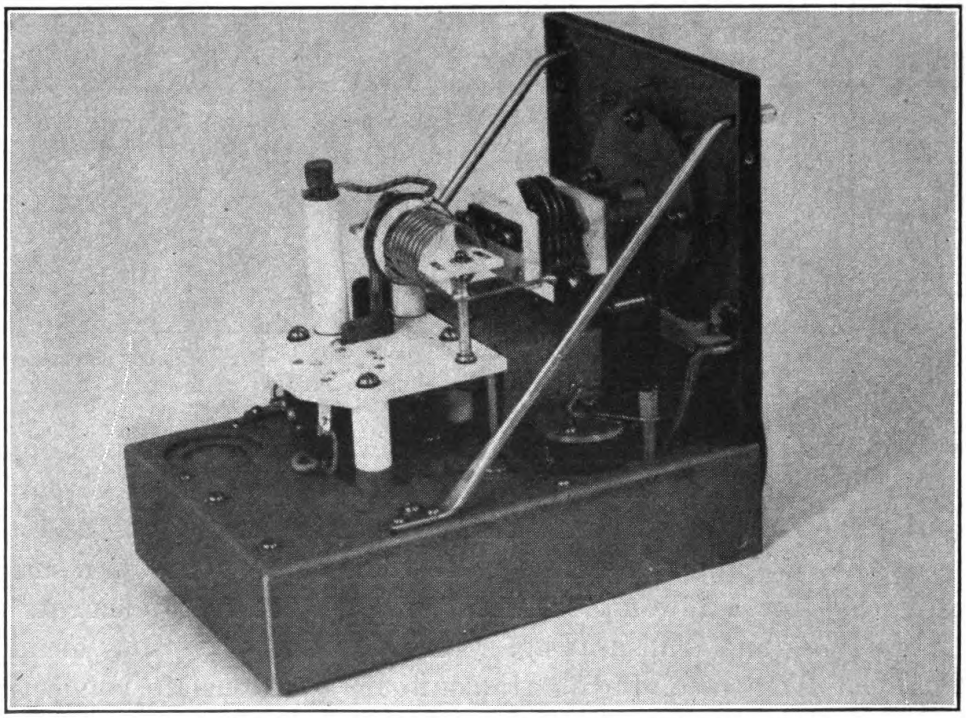


FIGURE 5.—Radio receiver and transmiter BC–222, left side of chassis.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

on the microphone or handset. The set uses a superregenerative detector and radio-frequency oscillator in a modified form of Hartley circuit. Controls are provided as follows: channel or frequency adjustment, calibration switch, calibration adjustor, filament rheostat, and filament switch. The meter on the left side of the panel indicates the voltage on the filaments, and the socket at the right serves to connect the handset or headset and microphone.

b. Dial scale plates.—Radio receivers and transmitters BC–222 and BC–322 are each provided with a dial scale which is marked off in

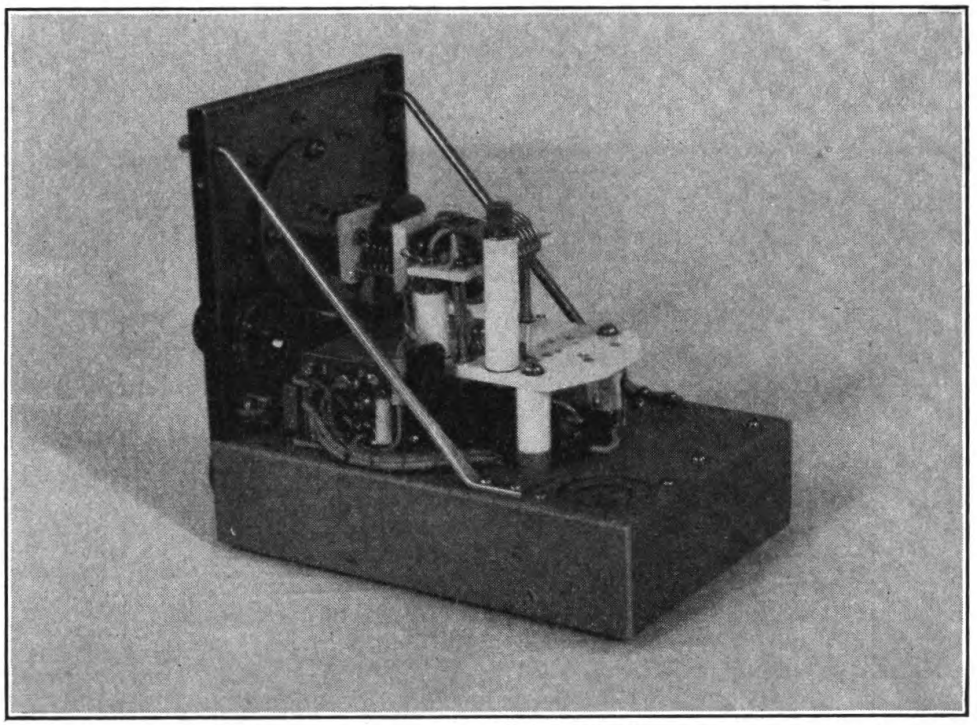


FIGURE 6.—Radio receiver and transmitter BC–222, right side of chassis.

400 kilocycle subdivisions and printed on a metal plate. Many sets are equipped also with a 500 kilocycle scale, the two scales being secured to the panel, one over the other, by means of five machine screws. Use of the 400 kilocycle scale only is now authorized. To interchange the dial scale plates it is necessary to remove the five screws, interchange the dial scale plates, and replace the screws. Tables of frequencies and dial divisions are given in section IV. (Earlier sets were provided with a reversible celluloid dial scale plate.)

c. Antennas AN–29–B and AN–30–B.—Each antenna consists of an assembly of telescoping monel metal tubes which, when in use,

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

are screwed into place on the insulated antenna mounting on top of the case. The radio set SCR–194 is operated with all twelve sections of AN–29–B drawn out using coil C–174, marked A; with the ten largest or lower sections using coil C–175, marked B. The radio set SCR–195 is operated with all eight sections of antenna AN–30–B drawn out. The calibration of either set will be correct only if the antennas are extended to the proper lengths at all times or operated

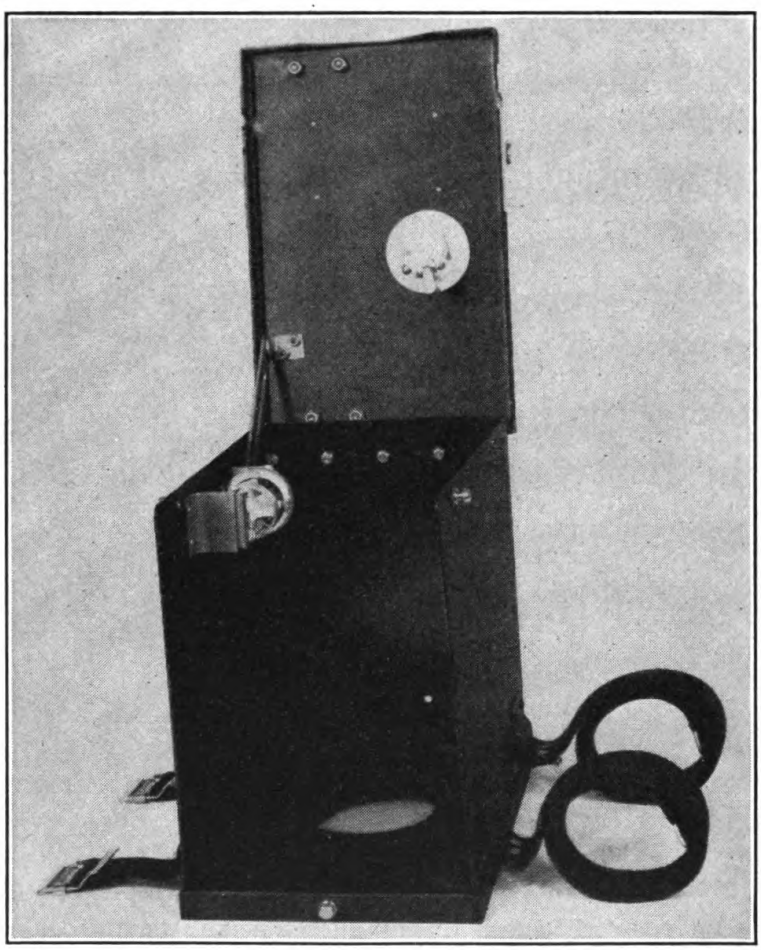


FIGURE 7.—Radio receiver and transmitter BC–222, case only, showing position of alternate coil and location of antenna coupling capacitor on under side of raised cover.

completely telescoped with only one section in use as described in paragraph 8.

d. Mast sections MS–49, MS–50, and MS–51.—These mast sections are made of high tensile strength steel. Mast sections MS–50 and MS–51 are fitted with a split shank and screw at one end and a socket sleeve and thread at the other. Mast section MS–49 terminates in a blunt point at the upper end. Ends which are joined in assembling

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

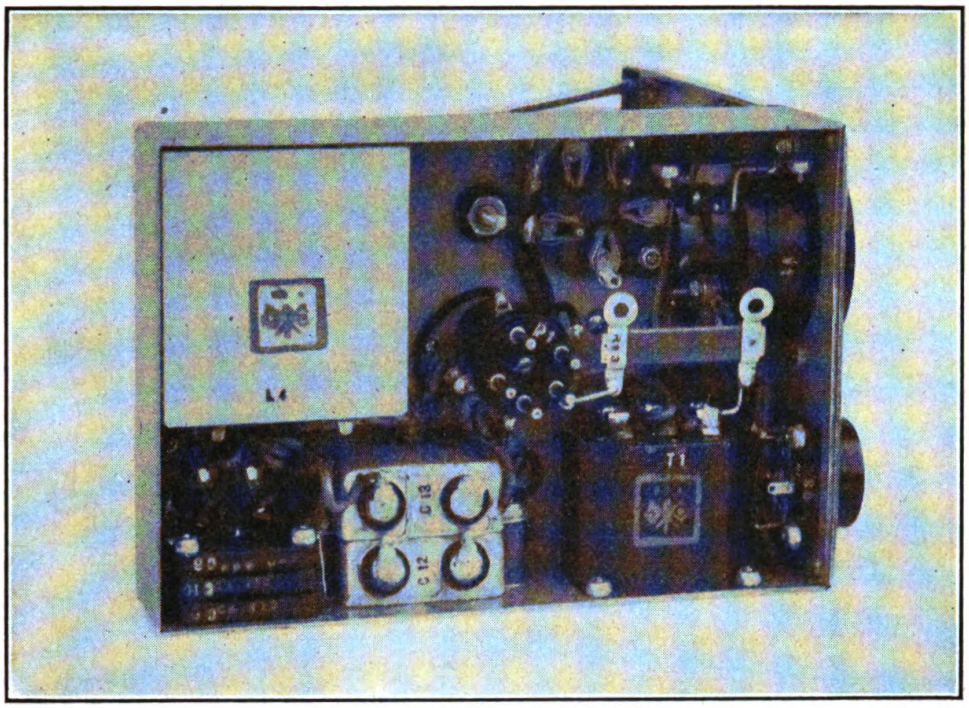


FIGURE 8.—Radio receiver and transmitter BC-222 or BC-322, under side of chassis, showing plug which fits into socket on battery BA-32.



FIGURE 9.—Radio receiver and transmitter BC-322, front cover removed.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

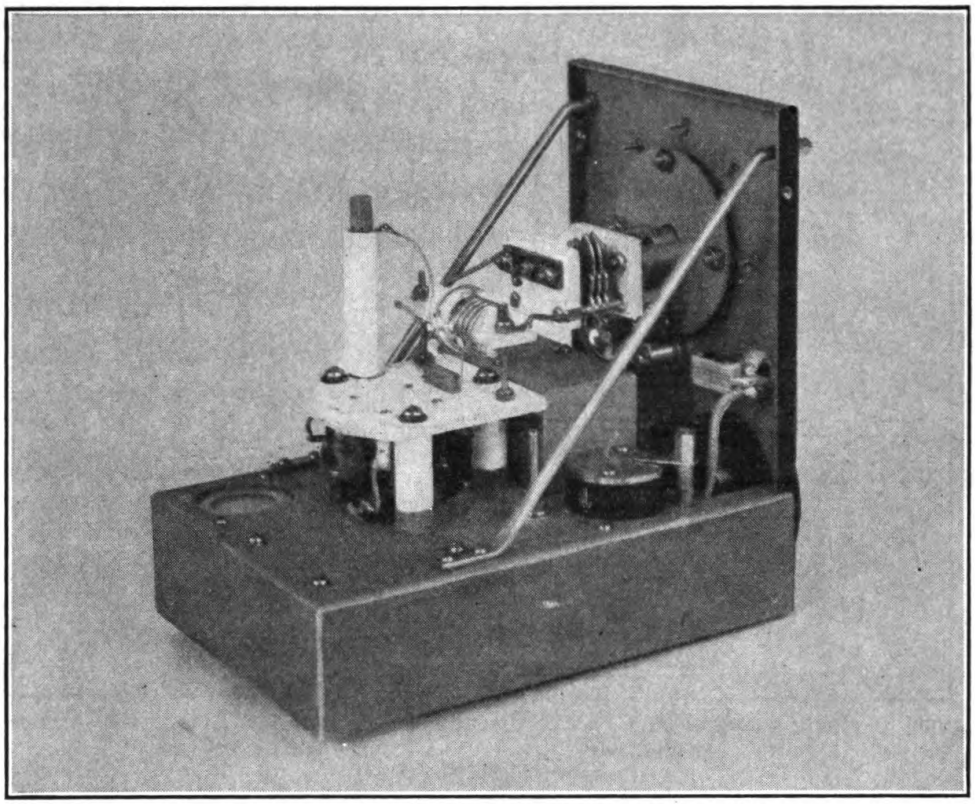


FIGURE 10.—Radio receiver and transmitter BC-322, left side of chassis.

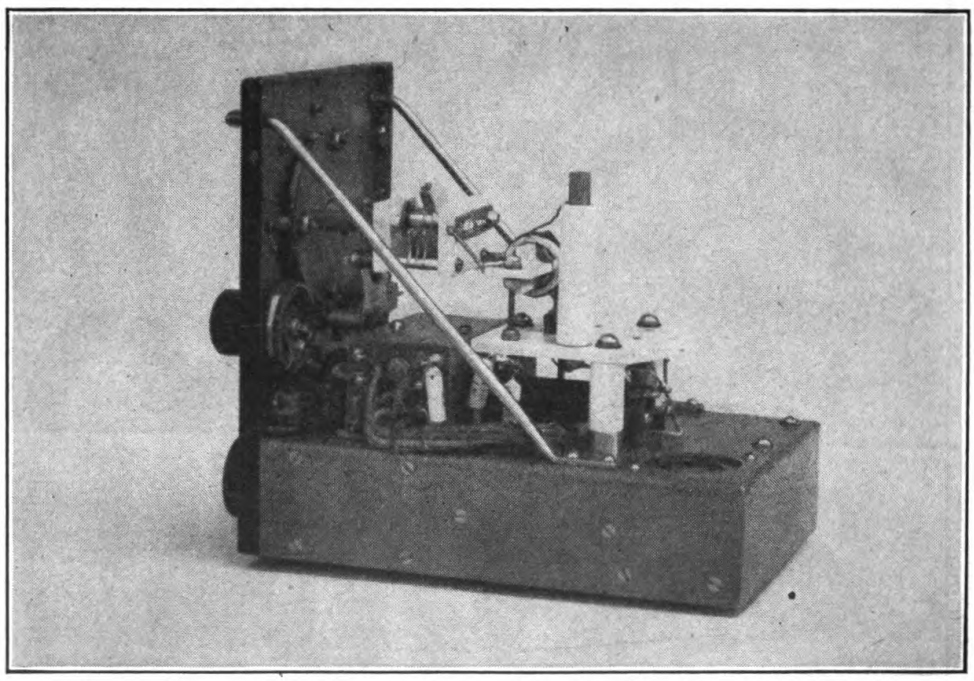


FIGURE 11.—Radio receiver and transmitter BC-322, right side of chassis.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

have enameled marks of the same color. The body of each section is enameled black and bears the type number near the lower end. When it is desired to use a vehicular antenna with the radio set SCR-194, an antenna equipment RC-67 is used. It includes two each of sections MS-49, MS-50, and MS-51. It also includes two binding posts TM-176, one mast base MP-22, and 10 feet of wire W-126. The over-all length of the three mast sections assembled is 9 feet $4\frac{11}{16}$ inches from the top to the bottom of the shoulder of the lower section. The radio set SCR-195 includes mast sections MS-50 and MS-51 for use in vehicles. The over-all length of these two sections assembled is 6 feet $3\frac{7}{16}$ inches from the top to the bottom of the shoulder of the lower section.

e. Mast base MP-22.—The mast base consists of a ceramic insulator fastened to a steel plate in such a manner as to permit rotation of the antenna through an angle of 180°. A metal socket is provided in the top of the insulator to receive mast section MS-51. The steel plate is designed to permit fastening to an upright on the transporting vehicle.

f. Battery BA-32.—This is a block battery so designed that it supplies all the necessary set voltages. A 5-point socket is provided in the top for making all electrical connections required between it and the set. Under continuous operation the life of this battery is approximately 20 hours. When used intermittently the life may be two or three times as great.

g. Bag BG-71 (fig. 12).—The canvas carrying bag is for the portable use of radio sets SCR-194 and SCR-195. It has two adjustable web shoulder straps similar to those on the haversack. It comprises three compartments, the main one being used for carrying the radio receiver and transmitter BC-222 or BC-322 complete and ready for operation. The other compartments are a pocket in the rear for carrying the following equipment:

Radio set SCR-194	*Radio set SCR-195*
1 headset HS-22-B	1 adapter SO-52
1 microphone T-24-E	2 handsets TS-11-E

and a pocket on the side for carrying the antenna AN-29-B or AN-30-B. To permit operation of the set while being carried in the bag, there is a hole in the top of the bag so that the antenna may be inserted in the set and a slide fastener in one side to permit access to the set panel. Further to protect the equipment in inclement weather and when not in use, an additional flap has been added to the top of the bag. This flap may be fastened down with the two

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA



FIGURE 12.—Bag BG-71.

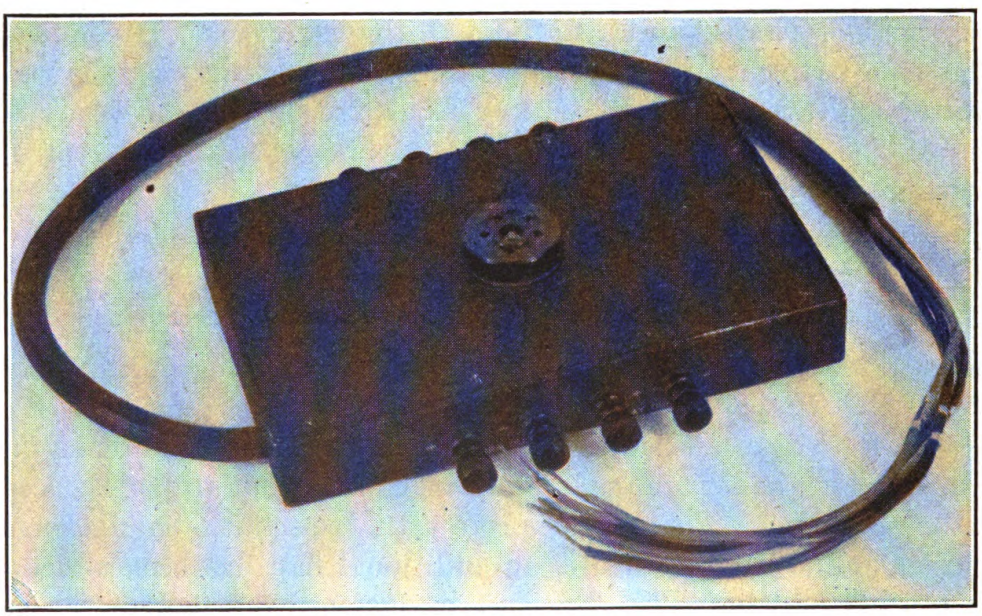


FIGURE 13.—Box BX-13.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

end snap fasteners, or when the antenna is being used it may be turned back into a double fold and fastened by the one center snap fastener. It is important that a double fold be used because a single fold results in snapping the fastener together inverted. When so fastened, the force necessary to use to unfasten it may result in tearing one side of the fastener from the bag.

h. Box BX–13 (fig. 13).—This consists of a flat rectangular metal box provided with a socket which fits the plug at the bottom of the radio receiver and transmitter BC–222 or BC–322, several binding posts, and a battery cable. It is designed to provide means of connecting separate batteries to the set in case there is no battery BA–32 available, and to facilitate the insertion of meters in the several circuits. The batteries are connected by means of the cable, all leads of which are identified by stamped metal markers. The binding posts, four on either side, serve to provide ready connection of meters to indicate microphone current, relay current, plate current, and plate voltage.

IMPORTANT: If it is desired to use this box without simultaneously connecting meters, each of the three pairs of binding posts marked MICRO. CUR., RELAY CUR., and PLATE CUR. must be connected with a jumper wire, otherwise there will be three open circuits. *Do not* jumper the binding posts marked PLATE VOLTS, as this will short-circuit the battery.

Caution: When making or changing jumper connections on box BX–13, be sure that the battery cable is disconnected from the battery. If this is not done, it is difficult to avoid burning out the two tubes sumultaneously. *Do not* attempt to make or change these jumper connections even if the filament switch is turned off, unless the battery is disconnected.

(1) To provide operating batteries if battery BA–32 is not available, the following Signal Corps batteries are suggested from among those which may be on hand:

Circuit	Normal open circuit voltage	Suggested substitute batteries
A (filament)	3	2 BA–17 or BA–23.
B (plate)	144	6 BA–8.
C (grid)	13.5	3 BA–27.
M (microphone)	4.5	1 BA–27.

(2) The following current and voltage readings (approximate) are normal for the radio sets SCR–194 and SCR–195:

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Receiver plate current	milliamperes	21.5
Transmitter plate current (modulated)	do	45.0
Transmitter plate current (unmodulated)	do	35.0
Relay current	do	18.5
Microphone current	do	35 to 60
Plate voltage	volts	135

A variation of plus or minus 10 percent is permissible.

i. Adapter SO–52 (fig. 14).—The adapter consists of a small metal fitting provided with a plug similar to plug PL–65 on one side and two sockets similar to sockets SO–45 on the other. All wiring is

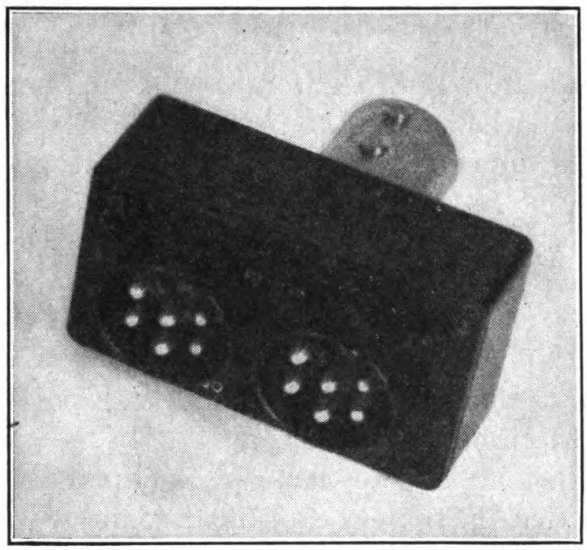


FIGURE 14.—Adapter SO–52.

within the fitting. The unit serves to enable the two handsets TS–11–E, provided with the radio set SCR–195, to be connected simultaneously. The plug of the adapter fits into socket SO–45 on the panel of the radio receiver and transmitter BC–322, and the two sockets of the adapter accommodate the plugs on the end of the handset cords.

j. Headset HS–22–B (fig. 15).—The headset consists of two receivers (similar to receiver R–14 except that each is equipped with a special cap and a cushion MC–144) attached to a strap ST–20 to fit over the wearer's head and a leather strap below. The latter is adjustable to fit the wearer by means of a sliding sleeve which may be locked in place. The headset cord CD–161 is terminated by a plug PL–55 which fits into a jack JK–38 on the microphone cord. This headset is part of the radio set SCR–194. It is designed to combine light weight with comfort and may be worn under a hat, helmet, or with a gas mask.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

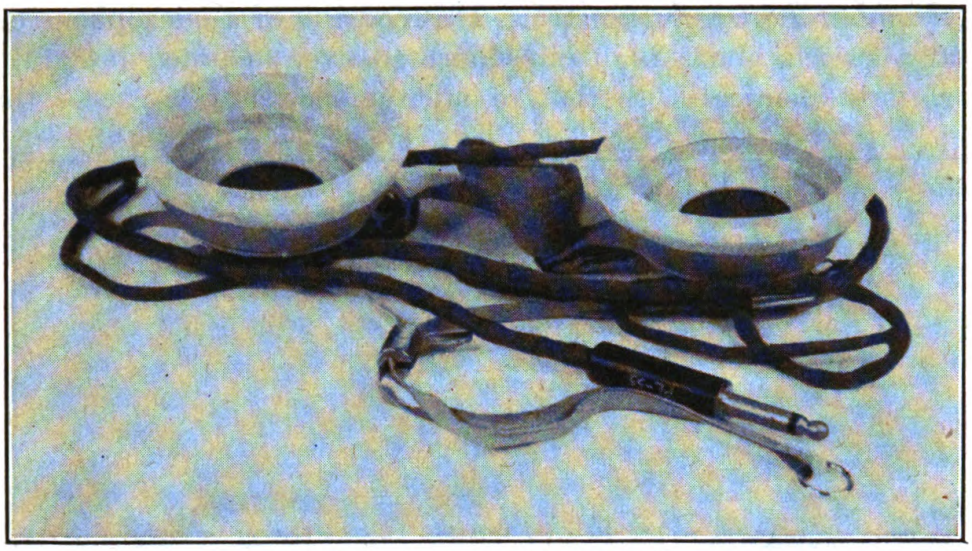


FIGURE 15.—Headset HS-22-B.

k. Microphone T-24-E (fig. 16).—The microphone comprises a hand microphone with a switch to which is connected a cord made of cordage CD-146, a jack JK-38 (for the attachment of one or two headsets HS-22-B), a radio frequency choke and a plug PL-106 for connection to the radio receiver and transmitter BC-222. This microphone is part of the radio set SCR-194.



FIGURE 16.—Microphone T-24-E.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

l. Handset TS–11–E (fig. 17).—This consists of a microphone element, a switch, and a high impedance receiver mounted integrally. Its cord is identical with that of microphone T–24–E except that

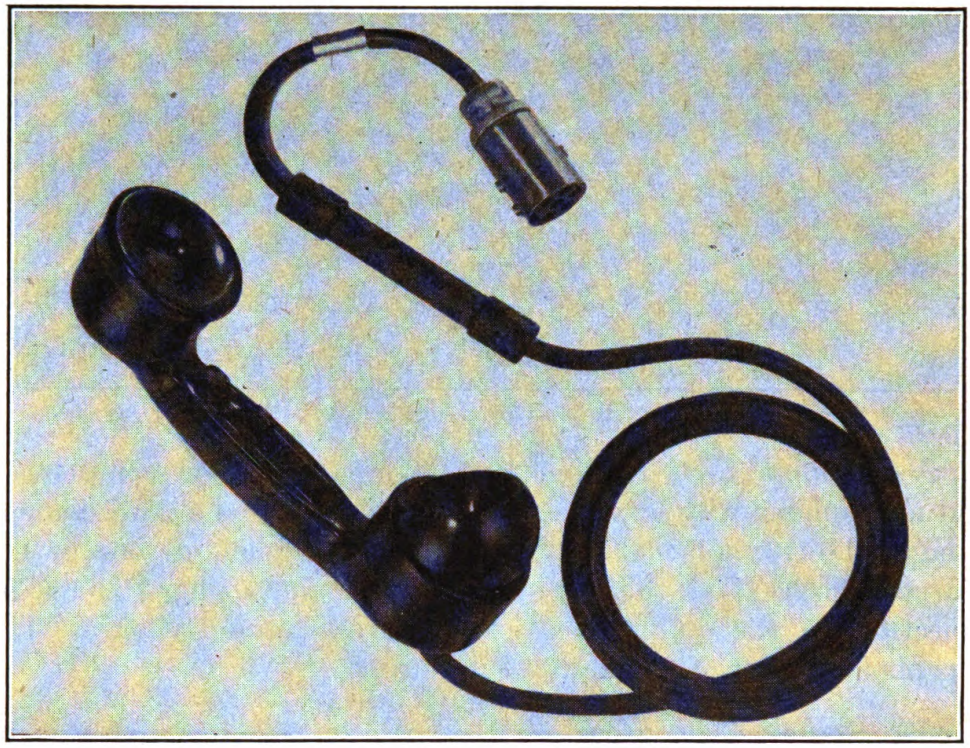


FIGURE 17.—Handset TS–11–E.

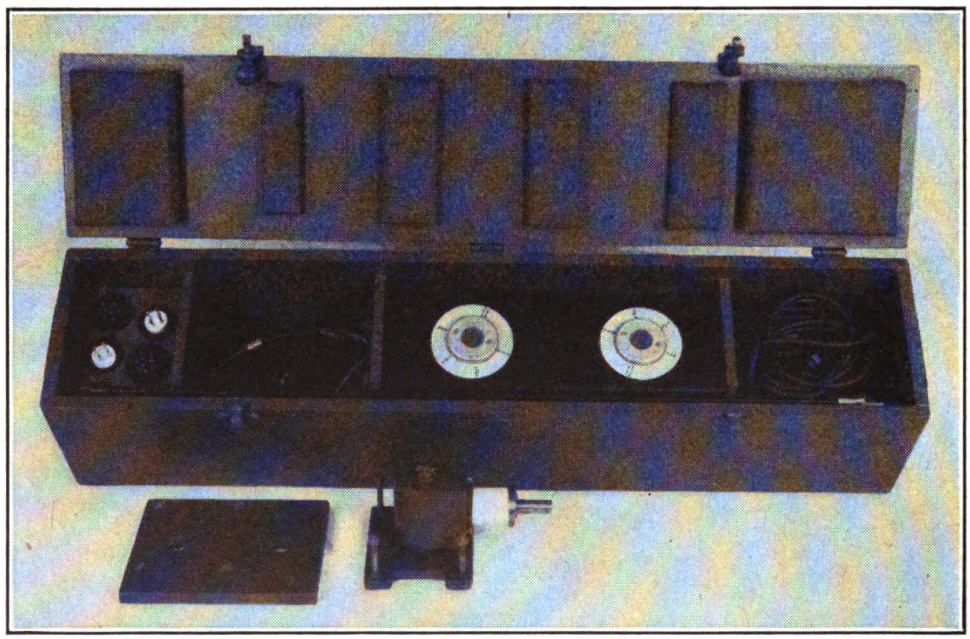


FIGURE 18.—Chest CH–33 showing interior (mast base MP–22 is carried in same compartment as box BX–13).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

jack JK–38 is not included. (Connection of two handsets to the radio receiver and transmitter BC–322 in this case is accomplished by means of an adapter SO–52.) Two of these handsets are part of each radio set SCR–195.

m. Cord CD–195 (figs. 1 and 2).—This is a 12-foot extension cord of the same type as that used with the microphone and handset. It incorporates a radio frequency choke, a plug PL–106 on one end, and a socket SO–86 on the other. It is employed when it is desired to use the microphone or handset at a greater distance from the radio set than their cords allow.

n. Binding post TM–176 (figs. 1 and 2).—The binding post is provided to afford a means of connecting the lead from the vehicular antenna to the radio set. When so employed it is screwed into insulator IN–96–A on the cover of the set.

o. Chest CH–33 (fig. 18).—This is a rectangular wooden box provided for carrying auxiliary and spare equipment. The interior is divided into four compartments as illustrated, and pads are fastened to the lid to prevent movement of the contents while being transported. The mast base MP–22 shown in front of the chest is carried in the same compartment as the box BX–13 and separated therefrom by a wooden block.

Section II

EMPLOYMENT

	Paragraph
Location and selection of frequencies	5
Setting up equipment	6
General operation	7
Portable operation	8
Vehicular operation	9
Service	10
Storage	11

5. Location and selection of frequencies.—The most suitable location within any given area for operation of this set will be determined by military requirements and the kind of terrain in the area between transmitting and receiving points. In general, elevated positions with line of sight between points are advantageous, as the field strength of the signal is affected considerably by ground elevations, ridges, and structures, as well as by the distance between transmitting and receiving points. With ranges of 3 to 5 miles or more the frequency or channel chosen should be as low as permissible. This is particularly true if irregular terrain, ridges, or hills lie between the selected locations. At frequencies in the

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

order of those used with these sets, various phenomena which are negligible with low frequencies assume considerable importance. Propagation of signals appears to assume the characteristics of light traveling in straight lines from point to point and reflecting from conducting objects such as smokestacks, water towers, buildings, and ground elevation, hills, or ridges. If satisfactory communication cannot be established at one location, removal to another location a short distance away may suffice to reduce or eliminate the difficulty. If change of location is not sufficient, a change of channel may be required in order to establish satisfactory communication. When sets of different nets must operate from the same locality, these nets should be assigned frequencies or channels of maximum separation, depending upon those available.

6. Setting up equipment (fig. 19).—Place the radio receiver and transmitter BC-222 or BC-322 on top of the battery BA-32 so that the marking FRONT on the battery is at the front of the set. This insures that the battery plug of the set is properly inserted in the battery socket. Secure the battery to the case by fastening the two straps which pass underneath and around the battery. Remove the front cover by releasing the snap slide at the bottom and pulling the cover out slightly and then down. This exposes the front panel. Open the top cover by releasing the two snap slides, one on either side, and raise it. Insert tubes VT-33 and VT-67 in their respective sockets and place the desired coil on the terminal posts provided. The two plug-in coils are designated coil C-174 and coil C-175 and are furnished as a part of radio receiver and transmitter BC-222. Coils C-174 and C-175 are also marked with the letters A and B respectively. These letters are followed by the serial number of the radio receiver and transmitter to which the coils belong. The coils are not interchangeable from set to set. Coil C-174 covers the frequencies from 27.7 to 38.5 megacycles, and coil C-175 covers the frequencies from 36.9 to 52.2 megacycles. The coil not in use is carried on a bracket inside the case (fig. 7). The coil in radio receiver and transmitter BC-322 covers frequencies from 52.8 to 65.8 megacycles. Connect the antenna lead of the coil to the antenna terminal post in radio receiver and transmitter BC-222. This lead is already attached in radio receiver and transmitter BC-322. Close the cover and secure it with the snap slides. Antenna AN-29-B is for use with radio receiver and transmitter BC-222 and antenna AN-30-B is for use with the radio receiver and transmitter BC-322. For use on the ground, extend antenna AN-29-B to its full length when using coil C-174, and reduce it by two sections when using coil C-175.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

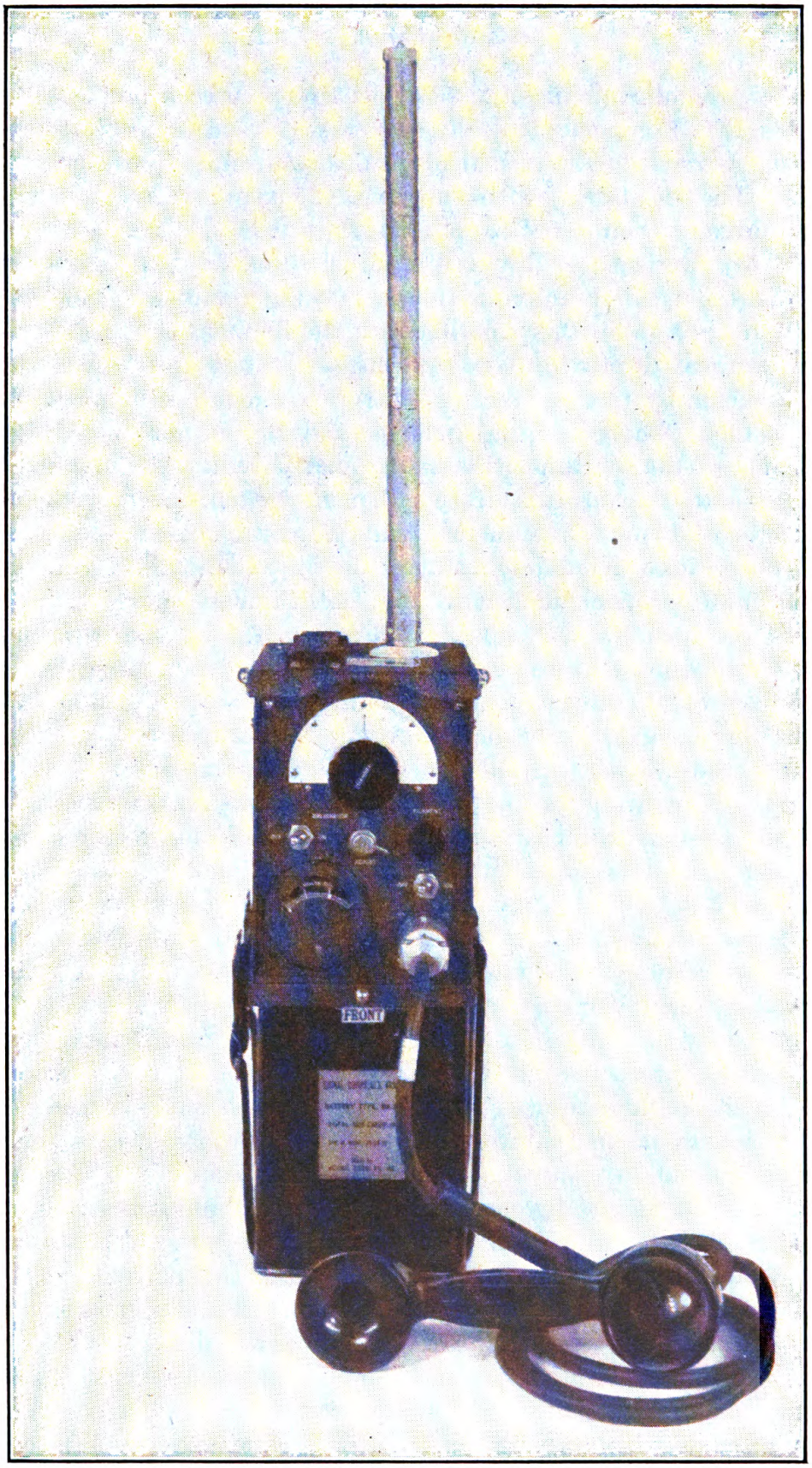


FIGURE 19.—Radio set SCR–195 ready for use.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

On the ground, antenna AN–30–B is always used extended to its full length. For portable use the antennas are used completely telescoped. Screw the antenna firmly into the insulated mounting provided. The insulator of the antenna mounting is fragile and is easily broken if subjected to unnecessary strains such as are caused by a loose antenna or by striking the antenna against obstacles. Connect the headset and microphone or the handset by means of the socket SO–45 on the panel beneath the filament switch.

7. General operation.—*a. Preliminary adjustments.*—Switch on the filaments by turning the toggle switch under the filament rheostat to ON. The cord plug must be inserted in socket SO–45 on the panel of the set, otherwise the filament circuit will remain open regardless of the position of the filament switch. Adjust the filament rheostat until the meter reads 2 volts. The meter has a luminous pointer and luminous mark on the scale at the 2-volt point to facilitate proper filament voltage adjustments in darkness. A hissing or rushing noise should be heard in the earphones immediately, indicating that the set is operating as a receiver. Operate the switch on the microphone or handset. This should actuate the relay BK–10, making the necessary circuit changes to prepare the set for transmitting. Speak or whistle into the microphone. If the set is operating properly you should hear this sound in the receiver. Set the tuning control marked CHANNEL to the channel on which it is desired to operate. The calibration adjustment should be checked at frequent intervals to insure on-frequency operation.

b. Adjustment of calibration.—The tuning dial scale is calibrated so that its readings of frequency channels may be easily and readily checked. Slight variations in the inductance or capacitance of the set, occasioned by change of relative position of the elements or of the wiring, differences introduced by changed tubes, or variation in antenna capacitance caused by changes in location, will cause the calibration to be inaccurate. The small adjusting or trimmer capacitor is used to compensate for these differences. This trimmer is adjusted and set by the small knurled thumbscrews marked ADJUST. Do not use undue pressure on the lock nut of this control as the threads are easily damaged. To check this adjustment, turn the switch above the meter to ON. Turn the tuning control back and forth through one of the red lines on the dial scale. As the control is turned through this line, there should be a marked decrease in the rushing sound produced in the receiver. If this point coincides exactly with the red line, the adjustment of calibration is correct. If it does not coincide exactly, readjust the calibrator until

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

it does. In making the adjustment, use the red line nearest the right hand or upper range of the dial scale.

c. Netting more than two stations.—These sets incorporate a superregenerative detector, and when receiving there is radiated a considerable amount of energy both on the frequency to which the set is tuned and in side bands, differing from this frequency by the frequency of the superregenerative quenching. For this reason it is difficult to operate more than two sets on the same frequency unless the sets are all at approximately the same distances from each other. For example, if three sets, called A, B, and C for identification, are operating in a net on a given frequency, and each is the same distance from the other two, little difficulty will be encountered. This has been found to be true for all distances ranging from a few feet to the maximum range of the sets. If, however, A and B are close together, and C is a considerable distance from both, A and B can communicate with each other easily, and C can hear both, but neither A nor B can hear C, since the receivers of A and B generate squeals which are stronger over the short distance separating A and B than the signal coming from C. The difficulty due to receiver regeneration encountered in operation with unequal distances between the sets will be roughly proportional to the inequality in the distances, the two nearer together having the most trouble in receiving the one most distant. This difficulty is overcome to a certain extent in radio set SCR–194 by the addition of a 20,000-ohm resistor in the plate circuit of the detector tube.

d. Tuning to nearby station.—The operating frequency or channel will, in general, be assigned. If the sets are calibrated accurately there should be very little, if any, readjustment of the tuning control required in order to receive signals clearly. When operating well within the distance range, tuning is effected by noting the decrease in the rushing sound as a signal is received. Signals will be received with greatest clarity when the receiving set is tuned so as to decrease the rushing noise to a minimum on the assigned channel. After making final adjustments, check the operating frequency. If it is found that the sets are tuned to a frequency which differs from that assigned by an appreciable amount, retuning should be effected in order to reduce the probability of interfering with communication on other channels.

e. Tuning to distant station.—At longer ranges where the signal strength is not high enough to cause a decrease in the rushing sound, more accurate tuning is necessary. In this case the time at which communication is to begin should, if possible, be agreed upon before-

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

hand, thus eliminating any doubt that the other set is in operation. It is also well to prearrange which station is to transmit and which is to receive when first attempting to establish contact.

f. Emergency means of communication.—If voice communication cannot be carried on intelligibly, code signals may be whistled into the microphone. These signals should be distinguishable where the voice would not.

g. Break-in.—The design of this equipment does not permit "break-in" operation, that is, speaking to the operator of another station while he is transmitting to you. If the other station is relatively close and is standing by, the attention of the operator may be attracted by closing and opening the switch on the handset or microphone a few times. This interrupts the rushing noise in the distant operator's receiver.

h. Faults.—Very few faults are likely to develop in the operation of these radio sets. Any difficulties which occur will probably result from tube or battery failure. The indications of these are generally the same and are—

(1) No rushing noise in the receiver.

(2) Necessity of adjusting the filament voltage beyond the required two volts before the rushing noise is heard.

(3) Weak signals.

(4) Set too slow to oscillate or fails to oscillate.

(5) Weak side tone.

If these indications are present, tubes and batteries should be replaced with others that are known to be satisfactory.

i. Crystals.—The crystals provided for calibration purposes are individually marked with a serial number which corresponds to the serial number of the set in which they are to work. They should not be changed from one set to another as each set is calibrated to correspond to the frequency of the crystal furnished with it. Do not open or remove the crystal from its holder.

j. Conserving batteries.—Due to the relatively short life of battery BA–32, sets should be turned off whenever possible in order to eliminate unnecessary battery drain. This may be accomplished by pulling out the handset or microphone plug, placing the filament switch at OFF, or by turning the filament rheostat counterclockwise as far as it will go. It is good practice to keep a record of the service which has been obtained from each battery, so that batteries which are partially discharged will not be taken into the field when it is known that a long period of operation will be required of them. Batteries which are run down, as evidenced by their inability to deliver two

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

volts to the filament or by failure of the receiver to oscillate throughout the band, should be discarded.

8. Portable operation (fig. 20).—*a. Antenna.*—Communication may be established between individuals moving about on foot by assembling the items listed in paragraph 3*a*(1) for the radio set SCR–194, or paragraph 3*b*(1) (for the radio set SCR–195), and



FIGURE 20.—Radio set SCR–195 showing method of carrying for portable operation.

carrying the equipment on the back as illustrated. The antenna AN–29–B (or AN–30–B) should preferably be operated completely collapsed. Two sections may sometimes be used to advantage and three sections occasionally. However, the calibration is adjusted for use only with the normal antenna or with a single section. Capacitor C–1 at the base of the antenna should never be moved from its marked and locked setting.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

b. Tuning the sets.—(1) Since the operating frequency may change slightly when a set is lifted to the carrying position on a man's back, the following procedure is recommended to insure operation on an assigned channel:

(*a*) Place one set in operation on the ground with its full antenna and adjust it carefully to the desired channel.

(*b*) Place the other set in operation on the back of the operator and carefully tune it to the first set.

(*c*) Now place the first set in carrying position and retune it to the second.

(2) Where one set is to remain in operation on the ground using full antenna, it is best to have the operator of this set make any readjustments which may be necessary to keep in communication with the carried set. If the frequency change due to this readjustment is such as to interfere with another channel, steps should be taken to have the carried set retuned as required.

c. Range.—It will be found that with two sets using extended antennas the operating range is not reduced appreciably when one set is man-carried and the other is on the ground. If the man-carried set is in motion, communication may be affected by proximity of obstructions and condition of the terrain being traversed. There is, however, considerable reduction in signal strength and range when one set uses a short antenna, and still further reduction when both sets use short antennas.

9. Vehicular operation (fig. 21).—For vehicular operation the antenna mast sections are used in conjunction with the mast base MP–22.* This base should first be secured within 2 or 3 feet of the position to be occupied by the set, while keeping the antenna and the lead-in wire as far from metallic body panels and other large metallic objects as possible. Antenna equipment RC–67, which includes three mast sections MS–49, MS–50, and MS–51, is used with the radio receiver and transmitter BC–222. Two mast sections MS–50 and MS–51 are issued as part of radio set SCR–195 for use with radio receiver and transmitter BC–322. Screw all mast sections together and into the mast base making sure that all joints are tight. Screw the binding post TM–176 into insulator IN–96–A on the top of the radio set. The wire used to connect the antenna with the set should be straight and should be secured to the binding post on mast

*Mast base MP–22, as issued, will not fit some of the newer vehicles because the lateral distance between the bolt holes in the mounting plate is not suitable. Simple and inexpensive fittings should be obtained from local repair shops to effect a secure mounting without modification of the mast base or the vehicle.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

base MP–22 and to binding post TM–176 on the radio set. Wire W–126 or W–9 furnished with the set should be used for this purpose. The set-up must be checked to determine that the wire is of the right

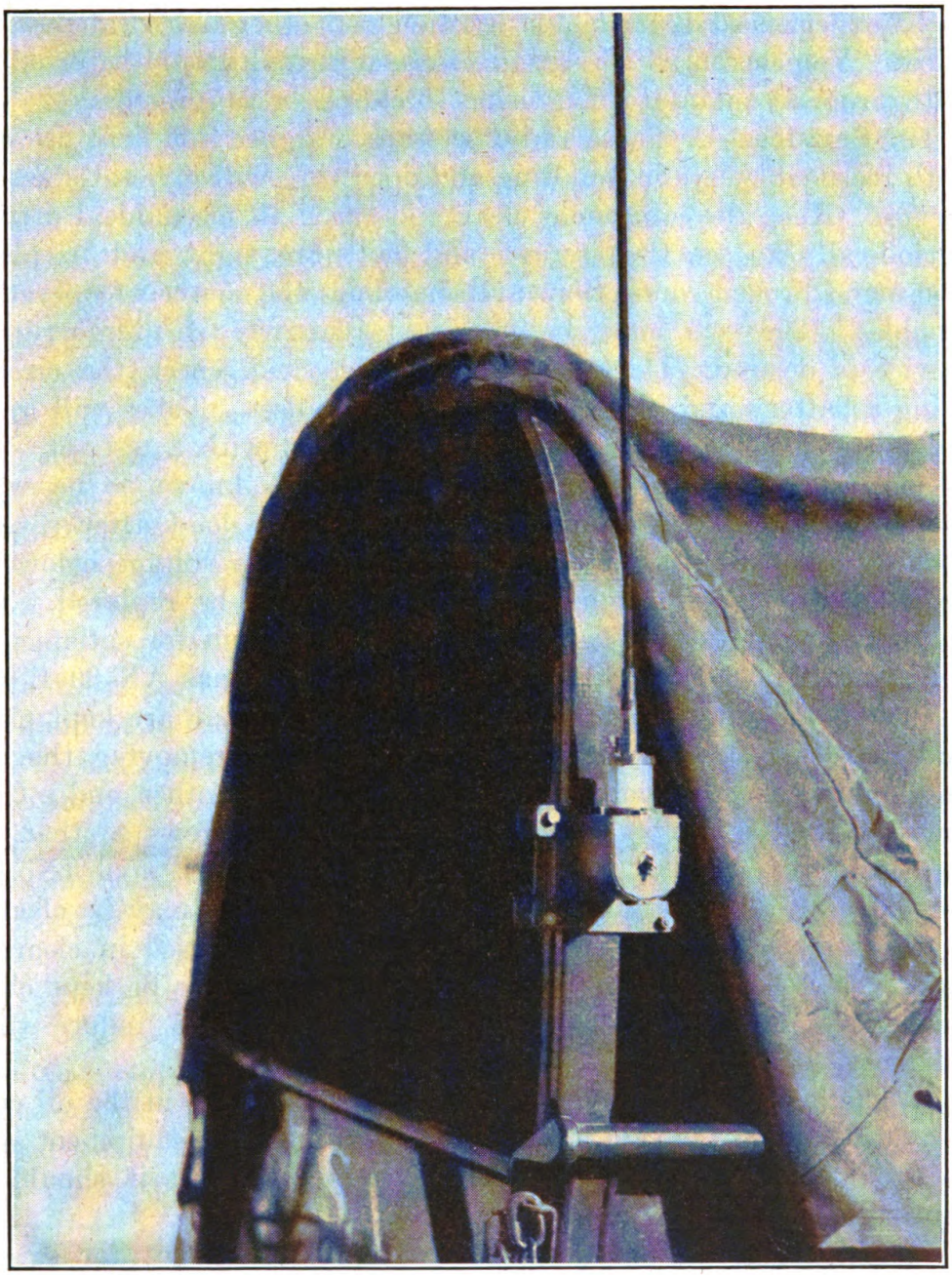


FIGURE 21.—Method of mounting mast base MP–22 to bow of truck.

length. With the set in operation, turn the tuning control throughout the entire range. If the receiver tends to howl at the low frequency end of the band, or lower channels, the lead is probably too short; if the howl occurs at the high frequency, or upper channel end

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

of the band the lead is probably too long. The set should be fastened securely in a manner serving to protect it against shocks and vibration after its correct location has been determined. Due to the high frequency and great sensitivity of these sets, interference is apt to be experienced from motor ignition and other electrical disturbances. Vehicles in which sets are to be operated should be provided with properly maintained ignition shielding or suppressors.

10. Service.—*a.* These radio sets are designed for field use and with reasonable care in handling and operating will give satisfactory service. Keep the equipment clean and check all mechanical fittings periodically to see that screws and nuts are tight and in place. Loose and broken connections are sometimes the source of operating troubles. The sets must be inspected regularly if uninterrupted service is desired. If open leads are suspected, check the circuit, using a battery and a small voltmeter or headset. Tubes will gradually lose their efficiency and should be tested with a test set, such as test set I–56–A, or interchanged with tubes known to be satisfactory. The battery should be checked under load after several minutes of operation, and if any part indicates a voltage below the ordinarily accepted standard the battery should be replaced. The following voltages may be considered the minimum for satisfactory performance: 3.6 M, 2.0 A, 10.8 C, 115 B. Antennas AN–29–B and AN–30–B are likely to become corroded unless they are kept clean and dry. To clean, disassemble the sections by removing the cap and nut at one end and the three screws at the other end. Care must be used in removing and replacing these screws so that the head and threads are not damaged. Use fine steel wool (No. 0) for cleaning the rods. *Do not use oil.* The inside may be cleaned in the same manner, using a small swab such as used in cleaning rifles. It is extremely important that these antennas be kept clean inside and outside as corrosion of the joints will reduce their efficiency.

b. The mast base MP–22 requires occasional oiling in the oil cups provided and on the cam mechanism. If any of the equipment such as the handset, headset, or microphone becomes wet it should be thoroughly dried.

11. Storage.—If the sets are to be out of service for several months the following precautions should be observed: Clean thoroughly the outside and inside of the radio receivers and transmitters. A vacuum cleaner hose may be used, if available, to take dust and dirt out of the interior. Compressed air should not be used. It is seldom that dry, clean air can be obtained and the pressure may

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

cause damage to the equipment. Cover the ends of steel mast sections with petrolatum. Detach the batteries. Store all equipment in a dry place and protect it from dust. Other equipment, except batteries, may be stored in chest CH-33. Store batteries separately. The radio receivers and transmitters (less batteries) may be placed inside bags BG-71 as a protective measure.

SECTION III

DETAILED FUNCTIONING OF PARTS

Paragraph
Radio set SCR-194 12
Radio set SCR-195 13

12. Radio set SCR-194.—*a. Transmitting* (figs. 22 and 24).—(1) *General.*—Relay BK-10 actuates the contacts which enable the set to function as a transmitter. The tube VT-67 serves as the oscillator and the tube VT-33 as the modulator. The oscillator circuit is of the Hartley type, modified so that the plate is maintained at radio-frequency ground potential. The tuning inductance is L_2. C_3 is the tuning capacitor and C_2 serves as the trimmer or calibration adjuster. R_1 and R_2 are the transmitting grid leaks. C_5 is the grid-blocking capacitor and C_6 serves to bypass radio-frequency currents in the plate circuit. C_4 acts as a coupling capacitor connecting the filament to the radio-frequency potential at the center of the coil L_2. L_3 is a radio-frequency choke carrying direct current to the filament and isolating the filament, which is at radio-frequency potential, from the ground. L_1 and C_1* provide inductive and capacitive feed to the antenna, which is a half-wave voltage-fed system. The antenna is not tuned or resonated at each operating frequency, but is tuned to a point within the normal range of the coil. The feed circuit provides fairly efficient coupling throughout the range of the coil set.

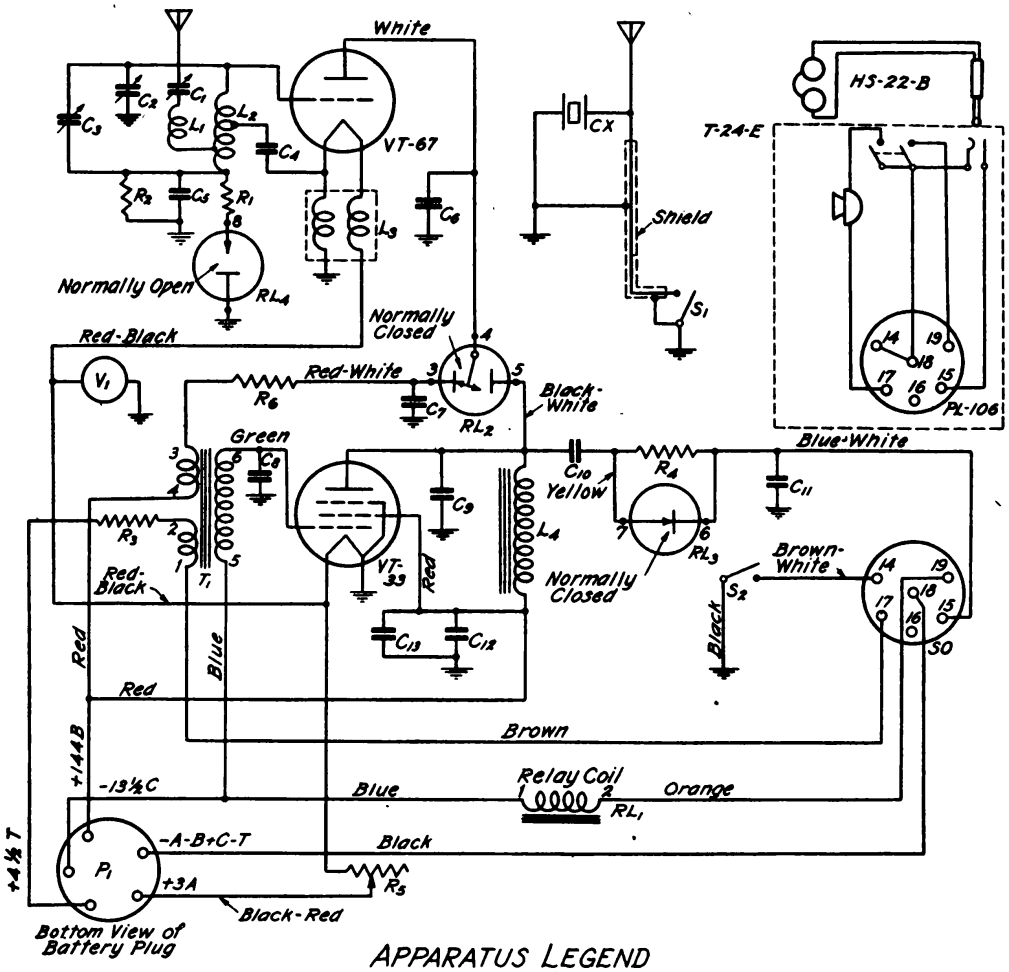
(2) *Modulation.*—The Heising (constant current) system of modulation is employed. L_4 is the modulation reactor. T_1 is the input transformer. Voice currents set up in the microphone circuit are passed through winding 1–2, and the stepped-up voltages on winding 5–6 are impressed on the grid of the tube VT-33. R_8 serves to

* Antenna coupling capacitor C_1 is accurately adjusted when the sets are manufactured and the adjustment should not be disturbed. The proper position of the rotor plates with respect to the stator plates is indicated by a pencil line on the top stator plate. If coupling is increased beyond this optimum point the set may not oscillate at the same frequency for both transmitting and receiving on a given channel. If the coupling is decreased, the maximum power input to the antenna will not be obtained.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

reduce the microphone current to the proper value. C_8, C_9, C_{12}, and C_{13} are bypass capacitors.

b. Receiving (figs. 22 and 25).—When the set functions as a receiver, the relay contacts are in the normal or nonactuated position. Tube VT–67 acts as a detector and tube VT–33 as the amplifier. The



APPARATUS LEGEND

C1 – Capacitor CA-272 – 10 μμf
C2 – Capacitor, Trimmer
C3 – Capacitor CA-265 – 6-32 μμf
C4 – Capacitor CA-266 – 100 μμf
C5 – Capacitor CA-270 – .001 μf
C6 – Capacitor CA-271 – .003 μf
C7 – Capacitor CA-211 – .002 μf
C8 – Capacitor CA-269 – 250 μμf
C9 – Capacitor CA-270 – .001 μf
C10 – Capacitor CA-271 – .003 μf
C11 – Capacitor CA-183 – .01 μf
C12 – Capacitor CA-177A – .5 μf
C13 – Capacitor CA-177A – .5 μf
CX – Crystal DC-4
L1, L2 – Coil C-174 (or C-175), Tuning
L3 – Coil, Filament Choke
L4 Coil C-165
P1 Plug, Battery
R1 Resistor RS-128-5000 Ohms
R2 Resistor RS-140-30,000 Ohms
R3 Resistor RS-158-40 Ohms
R4 Resistor RS-148-200,000 Ohms
R5 Rheostat RS-154-10 Ohms
R6 Resistor RS-130-20,000 Ohms
RL1-RL2-RL3-RL4-Relay BK-10
S1 Switch SW-105
S2 Switch SW-105
SO Socket SO-45
T1 Transformer C-159
V1 Voltmeter IS-121

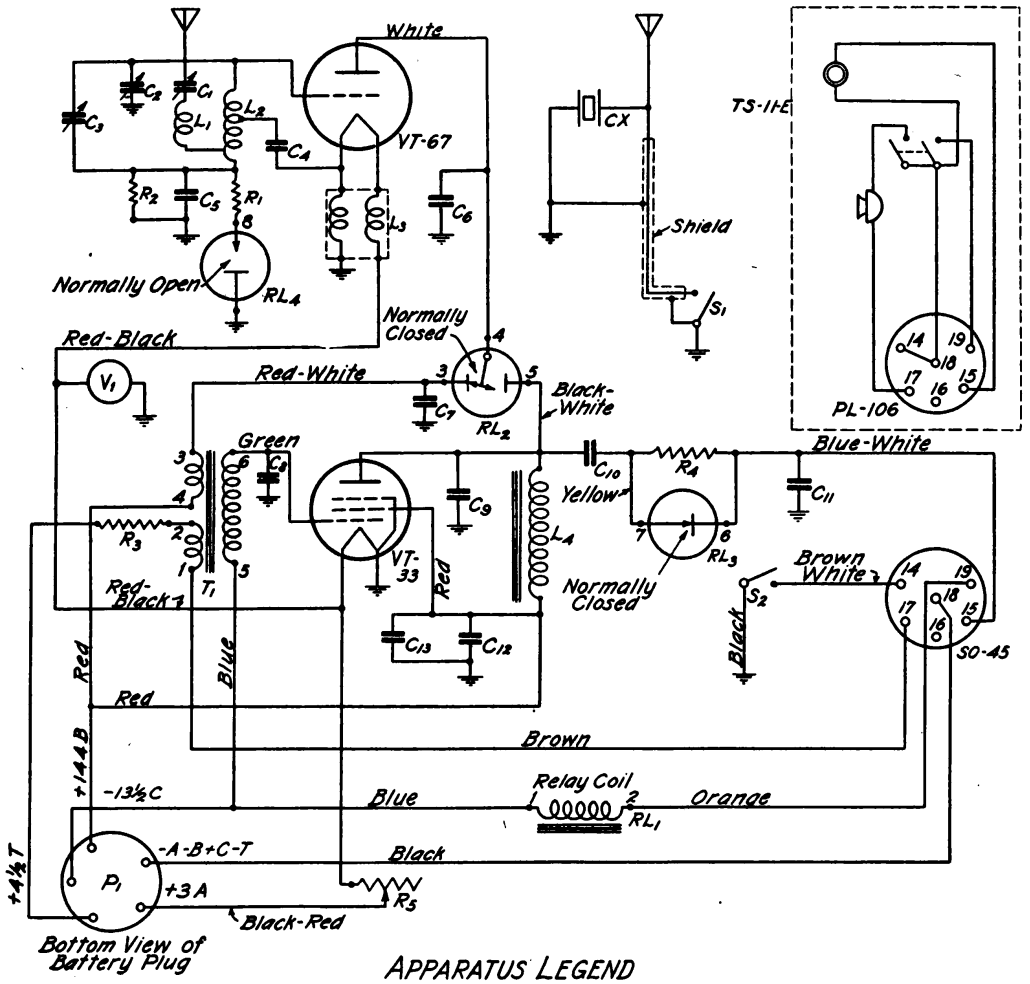
TL-3217

FIGURE 22.—Radio receiver and transmitter BC–222, schematic diagram.

NOTE.—Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable. Microphones T–24–A, T–24–B, T–24–C, T–24–D, T–24–E, and T–24–F are interchangeable.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

detector operates in a superregenerative circuit, R_2 and C_5 being of the proper value to cause blocking of the grid at approximately 20,000 cycles per second. R_6 in the BC-222 serves to reduce plate voltage on the detector in order to minimize receiver radiation. The rectified current in the plate circuit is passed through winding 3-4



APPARATUS LEGEND

C1-Capacitor CA-272 --10 μμf
C2-Capacitor, Trimmer
C3-Capacitor CA-288 --5-21 μμf
C4-Capacitor CA-287-- 50 μμf
C5-Capacitor CA-213 -- .001 μf
C6-Capacitor CA-271 -- .003 μf
C7-Capacitor CA-211 -- .002 μf
C8-Capacitor CA-269-- .250 μμf
C9-Capacitor CA-270-- .001 μf
C10-Capacitor CA-270-- .001 μf
C11-Capacitor CA-183-- .01 μf
C12-Capacitor CA-177-A-- .5 μf
C13-Capacitor CA-177-A-- .5 μf
CX-Crystal DC-5
L1, L2-Coil, Tuning
L3-Coil, Filament Choke
L4-Coil, C-165
P1-Plug, Battery
R1-Resistor - RS-128 - 5,000 Ohms
R2-Resistor - RS-140 - 30,000 Ohms
R3-Resistor - RS-158 - 40 Ohms
R4-Resistor - RS-148 - 200,000 Ohms
R5-Rheostat - RS-154 - 10 Ohms
RL1-RL2-RL3-RL4-Relay BK-10
S1-Switch SW-105
S2-Switch SW-105
SO-Socket SO-45
T1-Transformer C-159
V1-Voltmeter IS-121

TL 3213

FIGURE 23.—Radio receiver and transmitter BC-322, schematic diagram.

NOTE.—Handsets TS-11-A, TS-11-B, TS-11-C, TS-11-D, TS-11-E, and TS-11-F are interchangeable.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

of transformer T_1. The amplified signal voltage is impressed on the grid of the amplifier. After amplification, the signal voltage actuates the receiver of the handset or headset. R_4 acts to reduce side-tone current, and capacitors C_{10} and C_{11} serve as an audio-frequency filter. Capacitor C_6 serves to bypass radio-frequency currents. Tuning for

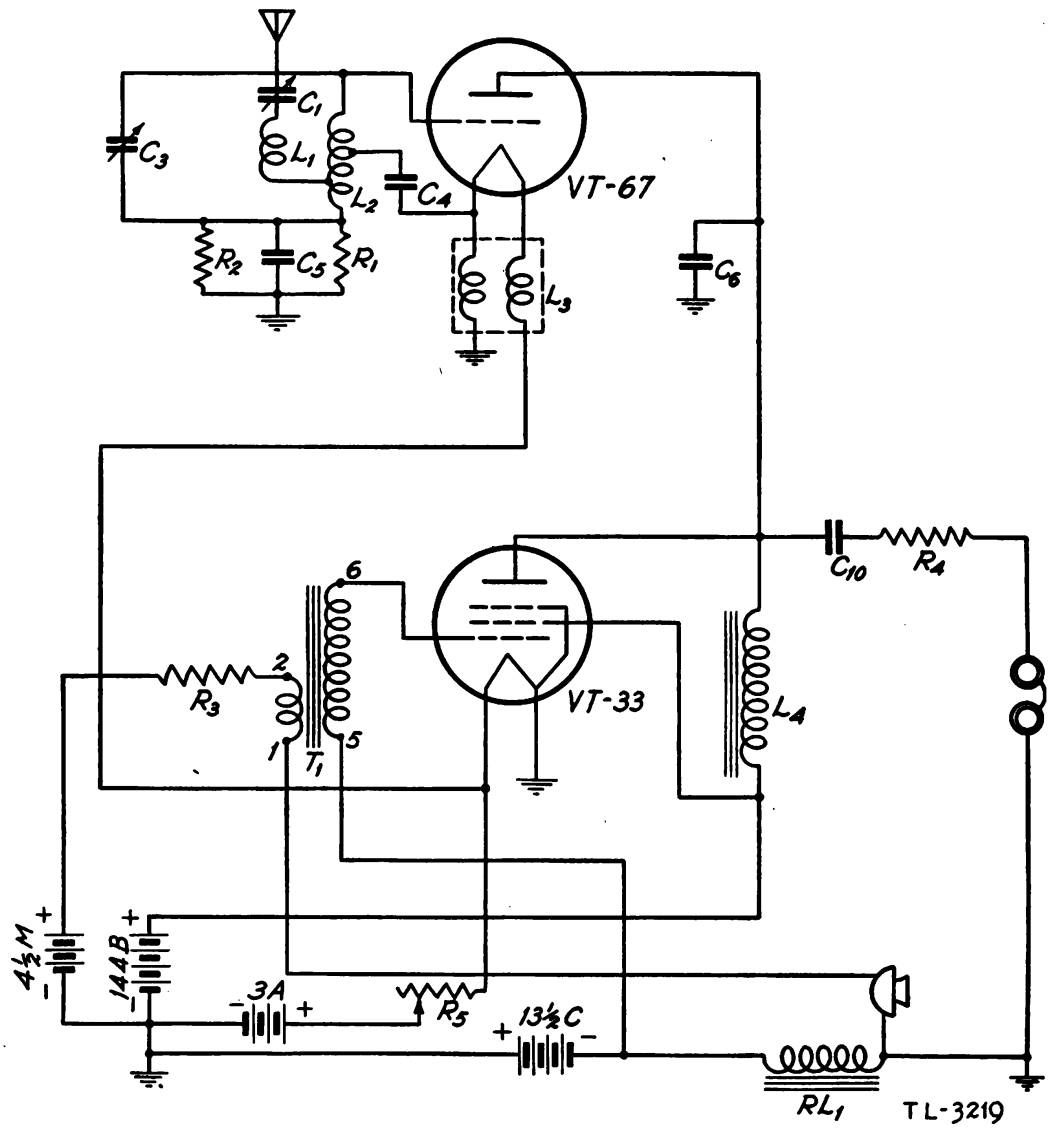


FIGURE 24.—Functional diagram (transmission).

reception is accomplished by means of coil L_2 and the variable capacitor C_3, the same as in transmitting.

c. Calibration.—The calibrator consists of the crystal CX, the small vertical rod antenna (mounted on and insulated from the base of the set), and the small switch S_1. The rod antenna applies a small radio-frequency voltage to the electrodes of the crystal. The

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

frequency of this applied voltage is the same as that being radiated by the set. When the frequency applied coincides with any one of the odd multiples of the fundamental frequency of the crystal, the

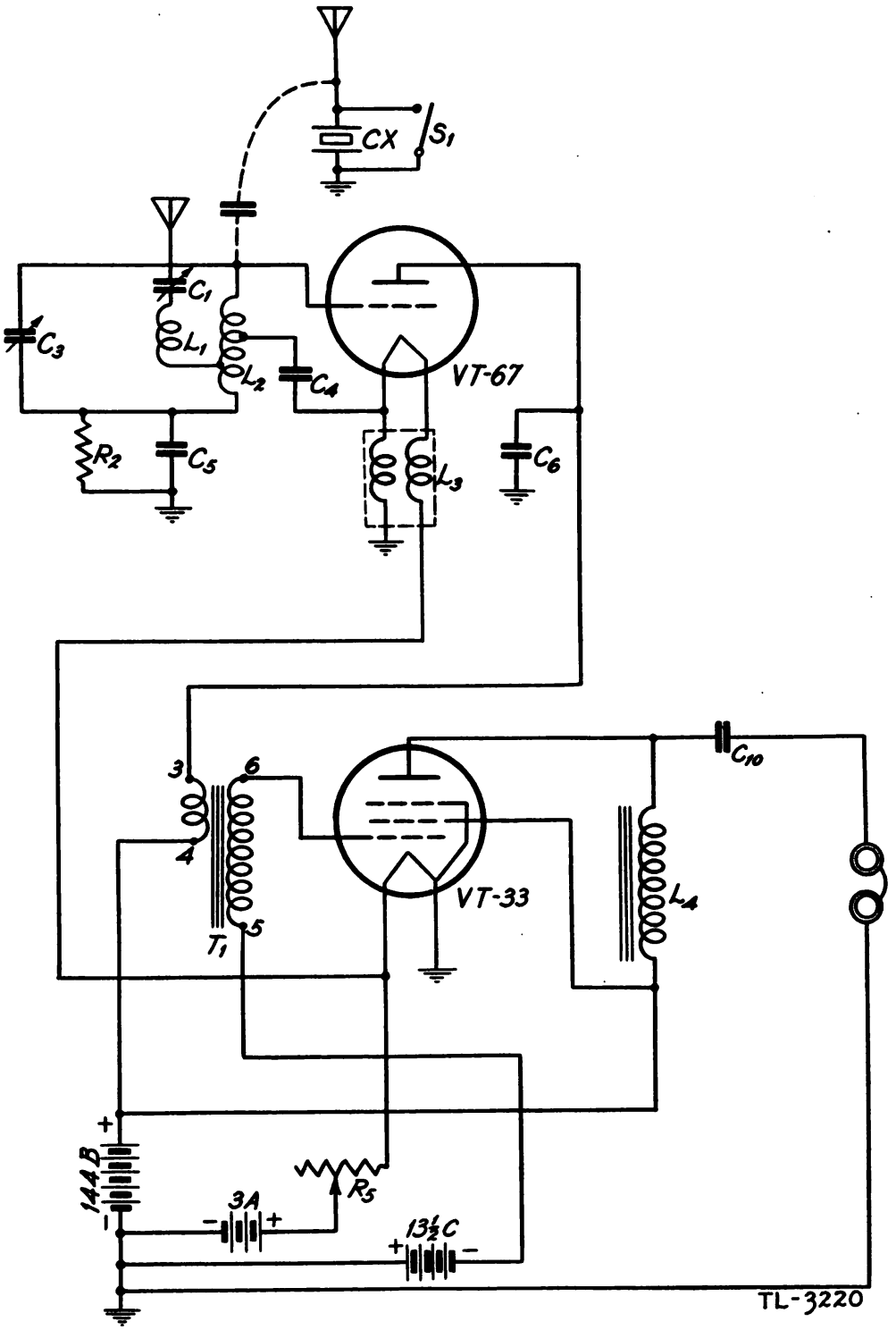


FIGURE 25.—Functional diagram (reception).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

crystal oscillates and absorbs energy. This absorption of energy causes the decrease in the rushing noise heard in the receiver. Switch S_1 short-circuits the crystal electrodes and prevents the application of voltage to the crystal. The several harmonic points of the crystal are indicated on the dial scale by red lines. These points should agree with the sharp decrease in the rushing noise (see par. 7*b*).

Caution: If for any reason the crystal is removed from its socket, care should be taken when replacing it to be sure that the seal on the assembly screws of the crystal holder does not make contact with the cover of relay BK-10.

13. Radio set SCR-195 (figs. 23, 24, and 25).—The function of the radio receiver and transmitter BC-322 of radio set SCR-195 is identical with that of radio receiver and transmitter BC-222 of the radio set SCR-194. In only one particular is the circuit arrangement different; the 20,000-ohm resistor (R_6 in radio receiver and transmitter BC-222) used to reduce the plate voltage on the detector is not included in radio receiver and transmitter BC-322, the same voltage being applied to the plates of both the detector tube and the audio-amplifier tube in the latter case.

SECTION IV

SUPPLEMENTAL DATA AND PARTS LIST

Paragraph
Frequencies and dial settings, radio receiver and transmitter BC-222 14
Frequencies and dial settings, radio receiver and transmitter BC-322 15
Parts list 16

14. Frequencies and dial settings, radio receiver and transmitter BC-222.—With 400 kilocycle separation there are 62 channels available using coils C-174 and C-175 as follows:

a. With coil C-174, marked A.

Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)
1	27. 70	11	31. 70	21	35. 70
2	28. 10	12	32. 10	22	36. 10
3	28. 50	13	32. 50	23	36. 50
4	28. 90	14	32. 90	24	36. 90
5	29. 30	15	33. 30	25	37. 30
6	29. 70	16	33. 70	26	37. 70
7	30. 10	17	34. 10	27	38. 10
8	30. 50	18	34. 50	28	38. 50
9	30. 90	19	34. 90		
10	31. 30	20	35. 30		

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

b. With coil C-175, marked B.

Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)
24	36. 90	37	42. 10	50	47. 30
25	37. 30	38	42. 50	51	47. 70
26	37. 70	39	42. 90	52	48. 10
27	38. 10	40	43. 30	53	48. 50
28	38. 50	41	43. 70	54	48. 90
29	38. 90	42	44. 10	55	49. 30
30	39. 30	43	44. 50	56	49. 70
31	39. 70	44	44. 90	57	50. 10
32	40. 10	45	45. 30	58	50. 50
33	40. 50	46	45. 70	59	50. 90
34	40. 90	47	46. 10	60	51. 30
35	41. 30	48	46. 50	61	51. 70
36	41. 70	49	46. 90	62	52. 10

15. Frequencies and dial settings, radio receiver and transmitter BC–322.—With 400-kilocycle separation there are 33 channels available as follows:

Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)	Channel number	Frequency (megacycles)
1	52. 90	12	57. 30	23	61. 70
2	53. 30	13	57. 70	24	62. 10
3	53. 70	14	58. 10	25	62. 50
4	54. 10	15	58. 50	26	62. 90
5	54. 50	16	58. 90	27	63. 30
6	54. 90	17	59. 30	28	63. 70
7	55. 30	18	59. 70	29	64. 10
8	55. 70	19	60. 10	30	64. 50
9	56. 10	20	60. 50	31	64. 90
10	56. 50	21	60. 90	32	65. 30
11	56. 90	22	61. 30	33	65. 70

16. Parts list.—The following list constitutes the major items of the radio sets SCR–194 and SCR–195. While the Signal Corps general catalog is controlling in regard to these component parts, the following list is given for information:

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

SCR-194	SCR-195	Article	Stock number
----------	1--------	Adapter SO-52----------	2Z252
2---------	----------	Antenna AN-29-B [1] (1 in use, 1 spare)-	2A229
----------	2--------	Antenna AN-30-B [2] (1 in use, 1 spare)--	2A230
1---------	1--------	Bag BG-71----------	2Z471
3---------	3--------	Battery BA-32 (1 in use, 2 spare)-----	3A32
1---------	2--------	Binding post TM-176----------	3Z276
1---------	1--------	Box BX-13----------	2Z1113
1---------	1--------	Chest CH-33----------	2Z2533
1---------	1--------	Cord CD-195----------	3E1195
----------	2--------	Handset TS-11-E [3]----------	2B611( )
1---------	----------	Headset HS-22-B [4]----------	2B822( )
----------	1--------	Mast base MP-22----------	2A2082
----------	2--------	Mast section MS-50 (1 in use, 1 spare)--	2A2350
----------	2--------	Mast section MS-51 (1 in use, 1 spare)--	2A2351
1---------	----------	Microphone T-24-E [5]----------	2B1624( )
1---------	----------	Radio receiver and transmitter BC-222-	2C5222
----------	1--------	Radio receiver and transmitter BC-322-	2C5322
3---------	3--------	Tube VT-33 (1 in use, 2 spare)-------	2T33
3---------	3--------	Tube VT-67 (1 in use, 2 spare)-------	2T67
25 feet----	25 feet---	Wire W-126 or W-9----------	1B126 or 1B9

[1] Antenna AN-29 may be substituted for antenna AN-29-B (antenna AN-29-C is not suitable for this use and no AN-29-A has been procured).
[2] Antenna AN-30 may be substituted for AN-30-B (no AN-30-A has been procured).
[3] Handset TS-11-A, TS-11-B, TS-11-C, TS-11-D, or TS-11-F may be substituted for handset TS-11-E.
[4] Headset HS-22-A or HS-22-C may be substituted for headset HS-22-B.
[5] Microphone T-24-A, T-24-B, T-24-C, T-24-D, or T-24-F may be substituted for microphone T-24-E.

SECTION V

REMOTE CONTROL EQUIPMENT RC-66

	Paragraph
Purpose----------	17
Setting up and connecting----------	18
Operating----------	19
Removing from service----------	20
Detailed functioning of parts----------	21
Parts list----------	22

17. Purpose.—Remote control equipment RC-66 is used with, but is not part of, radio sets SCR-194 and SCR-195. This equipment is designed to make possible the operation of radio sets SCR-194 and SCR-195 by remote control over telephone lines. It includes remote control unit RM-14, which contains all the essential components of a telephone EE-8 (except the handset) together with coupling transformers, switch, batteries, etc., for remote control, housed in a rugged metal box. Provisions are made for switching

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

the radio set from receive to transmit at the remote station, as well as for transmitting and receiving. When dismantled and packed in case CS-76-A for shipment, the equipment measures 10 by 8 by 7 inches and weighs 13 pounds.

18. Setting up and connecting.—*a.* Figure 26 shows the connections for operation on a ground return, and if desired, through switchboards such as BD-71 or BD-72. In order to provide for remote switching of the radio set from receive to transmit, push-button grounding switches SW-158-A and ground rods GP-30 are provided. The switching is accomplished through a simplex circuit on the telephone line. This operation may be carried through switchboards such as BD-71 and BD-72, except on lines having a repeating coil. There may be more than one switchboard between the control equipment and the remote controlling telephone provided that the control line does not pass through a repeating coil on any switchboard. Care should be taken to get a good ground connection. One ground rod GP-30 and one push button switch SW-158-A must be provided for each telephone which may have occasion to operate the radio. If trouble is encountered in obtaining a sufficiently good ground connection to work the switching relay in the remote control unit RM-14, an extra battery BA-2 may be conveniently added in this circuit. (See par. 21*a*.)

b. Figure 27 shows the connections for operation with a line return. This method of operation cannot be used when the telephone line passes through a switchboard, since the drop on the switchboard would hold the switching relay in the control unit in the transmitting position (see par. 21*b*). When telephone EE-8 or EE-8-A is used, no ground stake or push button is necessary, provided the screw switch on the telephone is closed as for common battery telephone operation. A jumper must be connected between the L_2 and GND terminals of the remote control unit RM-14 to complete the switching circuit. To switch the radio set from transmit to receive, it is necessary only to depress the lever switch on the telephone. To switch from receive to transmit, the lever switch must be released.

NOTE.—This is the reverse of the usual "push to talk" circuit. The lever switch must be depressed when the telephone is not in use so that the telephone may be rung.

19. Operating.—With the control equipment connected for remote operation as shown in figure 26 or 27, there are three modes of operation corresponding to the three positions of the lever switch on the control unit RM-14. These are TELEPHONE, RADIO, and THROUGH (see fig. 28).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

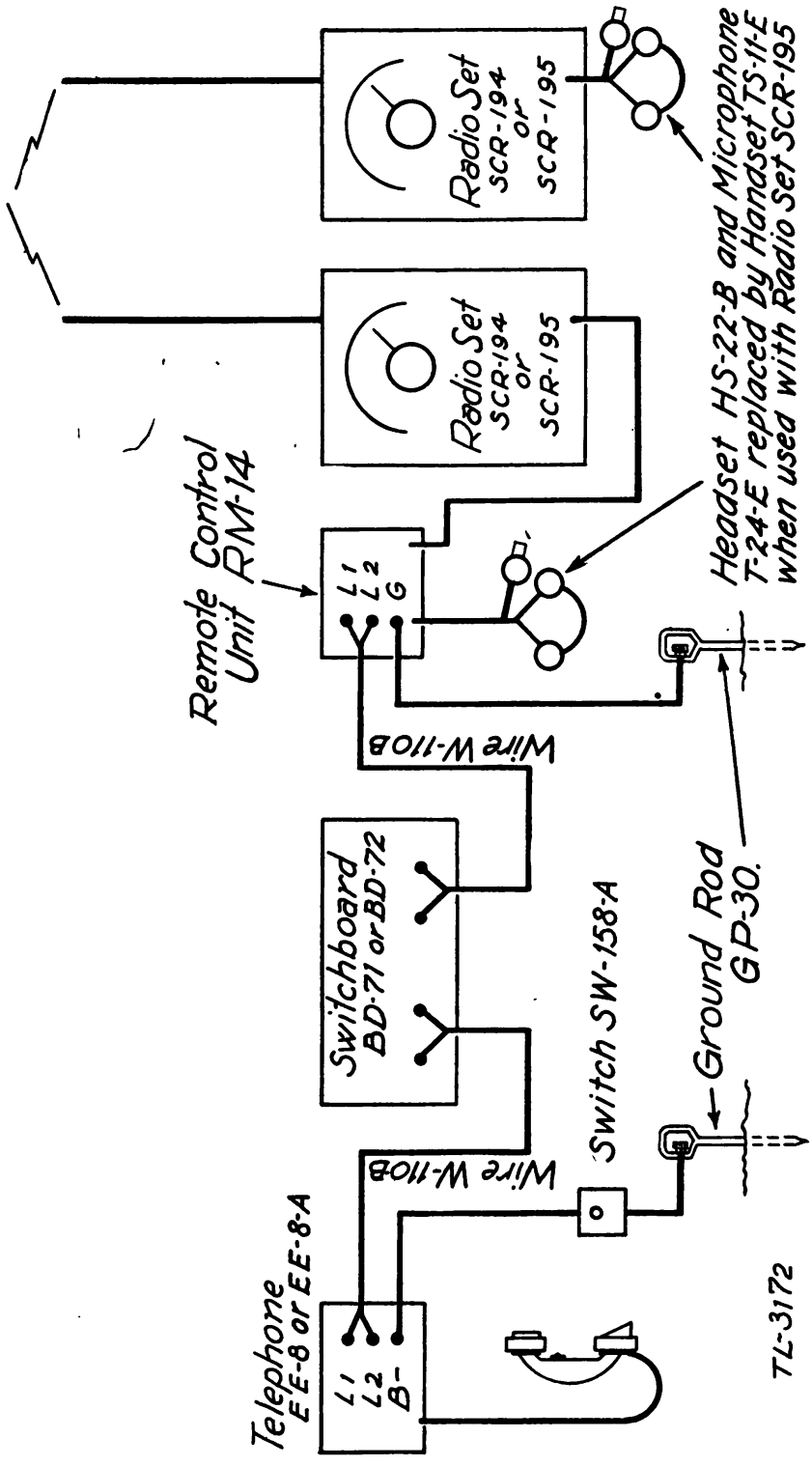


FIGURE 26.—Cording diagram; switching with ground return.

NOTE.—Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable. Handsets TS–11–A, TS–11–B, TS–11–C, TS–11–D, TS–11–E, and TS–11–F are interchangeable. Microphones T–24–A, T–24–B, T–24–C, T–24–D, T–24–E, and T–24–F are interchangeable.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

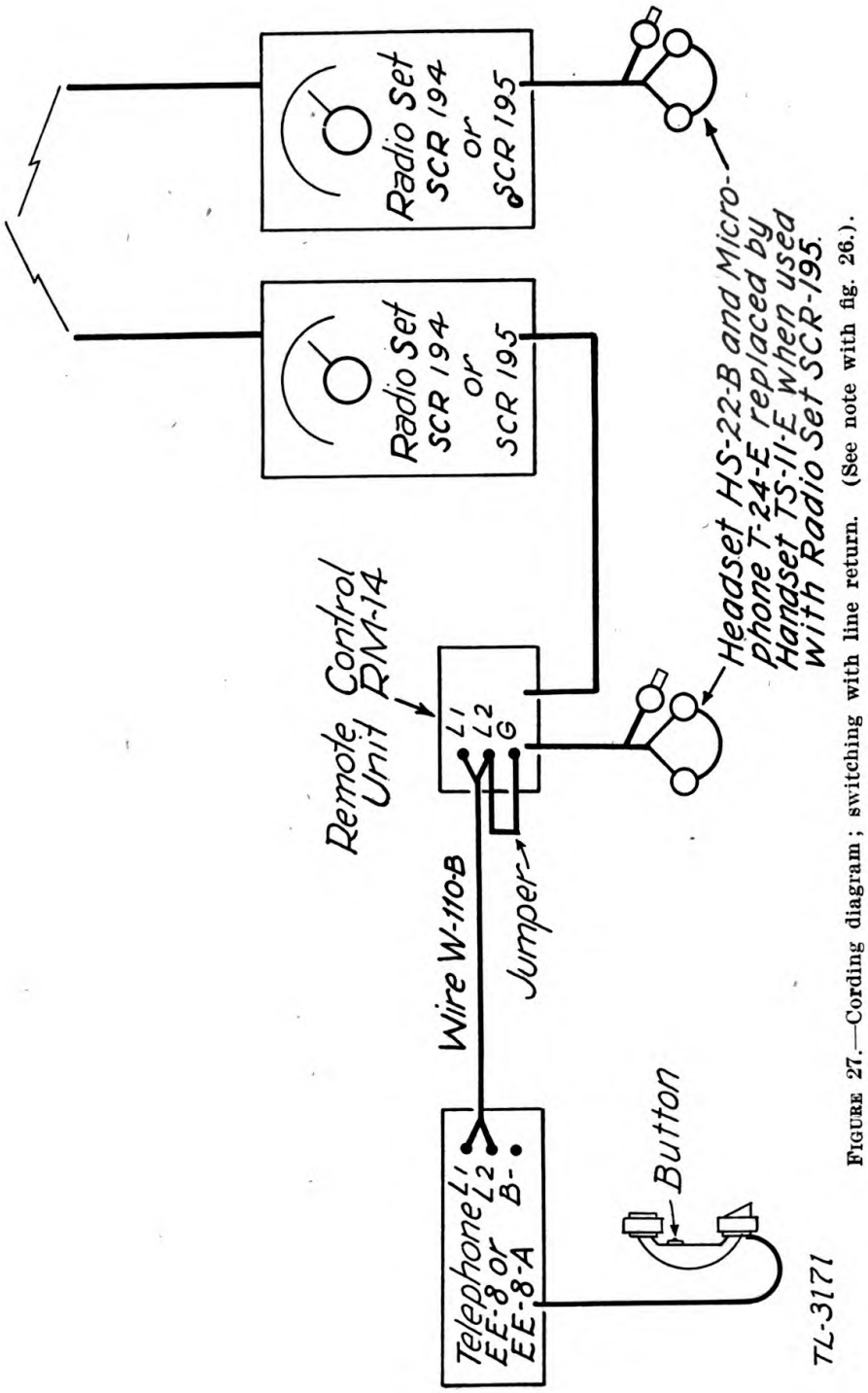


FIGURE 27.—Cording diagram; switching with line return. (See note with fig. 26.).

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

a. When the switch is in the TELEPHONE position, the unit is operated strictly as a telephone. If equipment is used with radio set SCR–195, the switch button on microphone T–24–E, or the switch on handset TS–11–E performs the same function as the switch on the

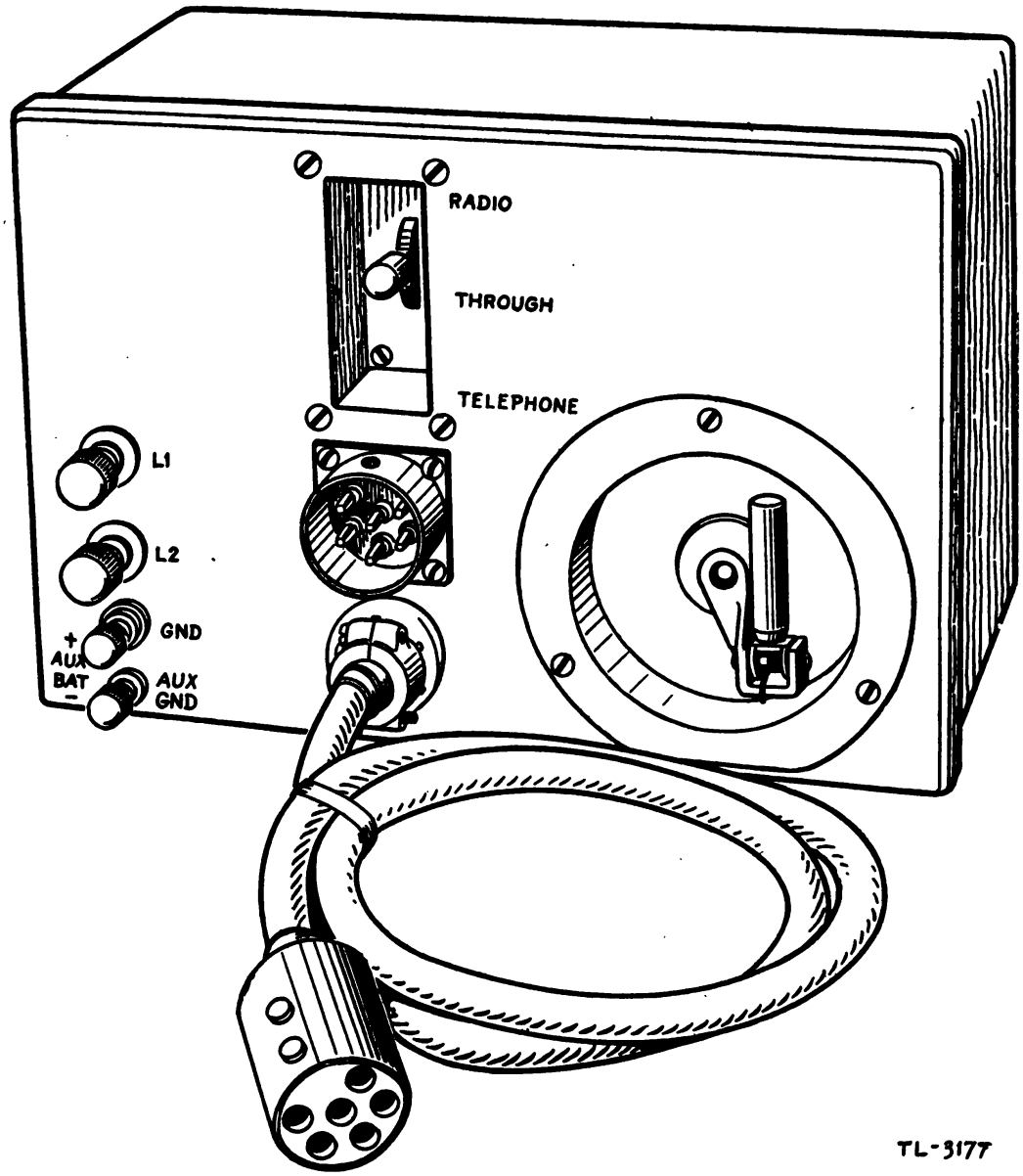


FIGURE 28.—Remote control unit RM–14, front view.

handset TS–9 in telephone EE–8 or EE–8–A. Figure 29 shows the control equipment set up for operation on ground return circuit with radio set SCR–194 and telephone EE–8–A.

b. When the switch is in the RADIO position, the operator is disconnected from the telephone line and is connected directly to radio set

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

SCR–194 or SCR–195 which is operated in the usual manner. The ringer is connected to the telephone line and may be rung from the remote telephone or switchboard on the line.

c. With the switch in the **THROUGH** position the output of the radio set is fed to the telephone line and the signal from the line is

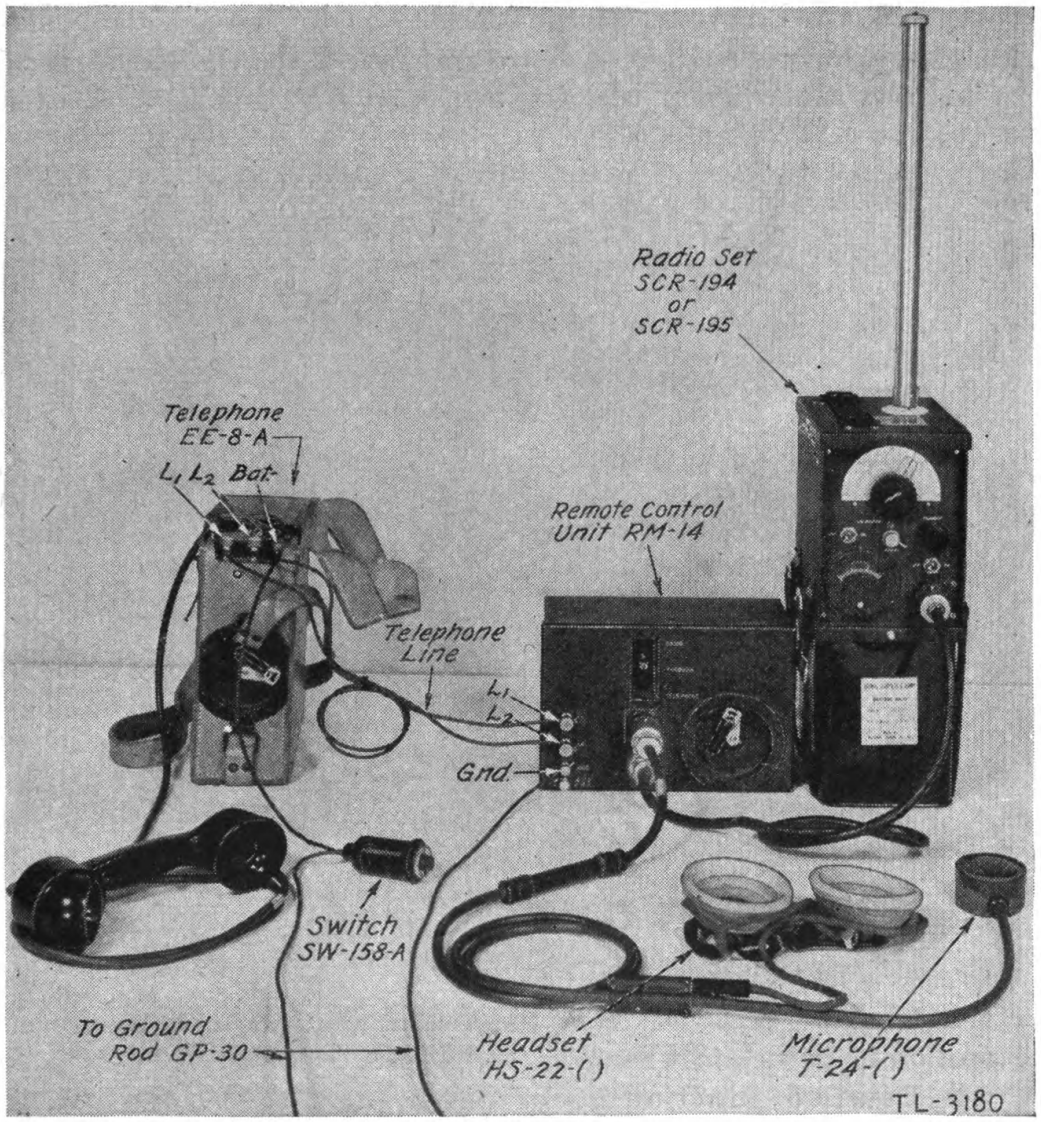


FIGURE 29.—Remote control equipment RC–66 set up with associated equipment.

fed to the radio set. The radio set is changed from receive to transmit as described in paragraph 18*a* or *b*. When, for any reason, the remote switching circuit cannot be established, the switching may be accomplished by the radio operator by pressing his microphone switch. The radio operator can hear all messages both ways on the line, although he cannot talk on the line.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

20. Removing from service.—Case CS–76–A (fig. 30) is designed with three pockets or compartments which house the remote control equipment RC–66 when not in use. The principal pocket is for the remote control unit RM–14. A second pocket, on the side opposite the snap fasteners, is intended to provide for carrying ground rods GP–30 and switches SW–158–A. A third pocket between the two above-mentioned pockets is to accommodate chart MC–222, which is similar to figure 26. When the equipment is not to be used immediately, the two batteries BA–30 and the battery

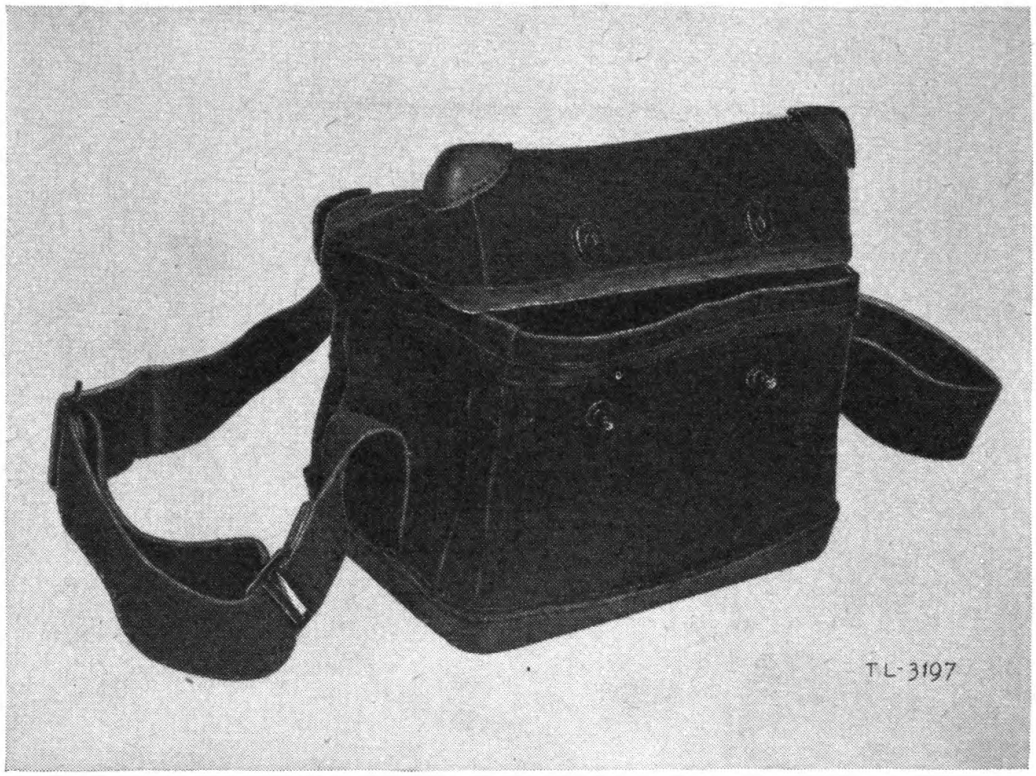


FIGURE 30.—Case CS–76–A.

BA–2 must be removed from the remote control unit to prevent corrosion of parts and wiring.

21. Detailed functioning of parts (figs. 31, 38, and 39).—*a. Switching on ground return circuit* (par. 18*a*).—A functional diagram of the switching circuit of remote control unit RM–14, together with that part of the circuit of telephone EE–8 which affects the switching circuit is shown in figure 32. The solid lines and the L_1 side of the telephone line indicate the path of the switching current. For simplicity, plugs, sockets, and the 3-position switch on the remote control unit, which must be in the THROUGH position, have been omitted. It can be seen that the function of the switching

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

current in the telephone line is to operate the remote control relay BK-24, which in turn closes the switching circuit in radio set SCR-194 or SCR-195. The relay BK-24 acts in the same manner as the switch on the microphone T-24-E or on the handset TS-11-E in changing over the radio set from transmit to receive. Since the L_2 side of the line has capacitor CA-177-A in the circuit, it can be seen that the remote control switching mechanism will not operate unless the same side of the telephone line is connected to the L_1 terminals on both the telephone EE-8-A or EE-8 and the remote control unit RM-14. If the unit does not operate as first connected, reverse the line terminals either at the telephone or at the control unit.

NOTE.—Do not connect the switch SW-158-A between ground and the L_1 or L_2 terminals of telephone EE-8 or EE-8-A, since under this condition the switching circuit will load the modulation circuits, and loss in voice current will result (see fig. 32). Always connect the switch SW-158-A between ground and the BAT terminal. The switching voltage may be increased by moving the ground connection at remote control unit RM-14 from the GND terminal to the AUX GND terminal and adding an auxiliary switching battery BA-2 across the AUX BAT terminals. The auxiliary battery and ground connections are shown in dotted lines in figure 32.

b. Switching without good return (par. 18*b*).—The L_2 side of the line may be used as a switching return instead of the ground by the following changes:

(1) Turn the screw switch of telephone EE-8 or EE-8-A to the common battery (CB) position.

(2) Remove the ground connections both at the telephone and at the remote control unit RM-14.

(3) Connect a jumper between the L_2 and GND terminals of the remote control unit RM-14.

The lever switch on telephone EE-8-A (or EE-8) now acts in the same manner as switch SW-158, except that when pressed, the radio set is switched to the receiving position, and when released, the radio set is switched for transmitting. Those parts of telephone EE-8 and EE-8-A which affect this type of operation and also the jumper from L_2 to GND on the remote control unit, are shown dotted in figure 32.

c. Transmission.—The path of the voice current from telephone EE-8-A (or EE-8) to the input transformer of radio set SCR-194 or SCR-195 is shown in figure 33. For simplicity, all switches, ringer, generator, plugs, etc., in the circuit are omitted. These may be seen in figures 22, 23, and 31. Although the talking battery of remote control unit RM-14 and the microphone battery of the radio

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

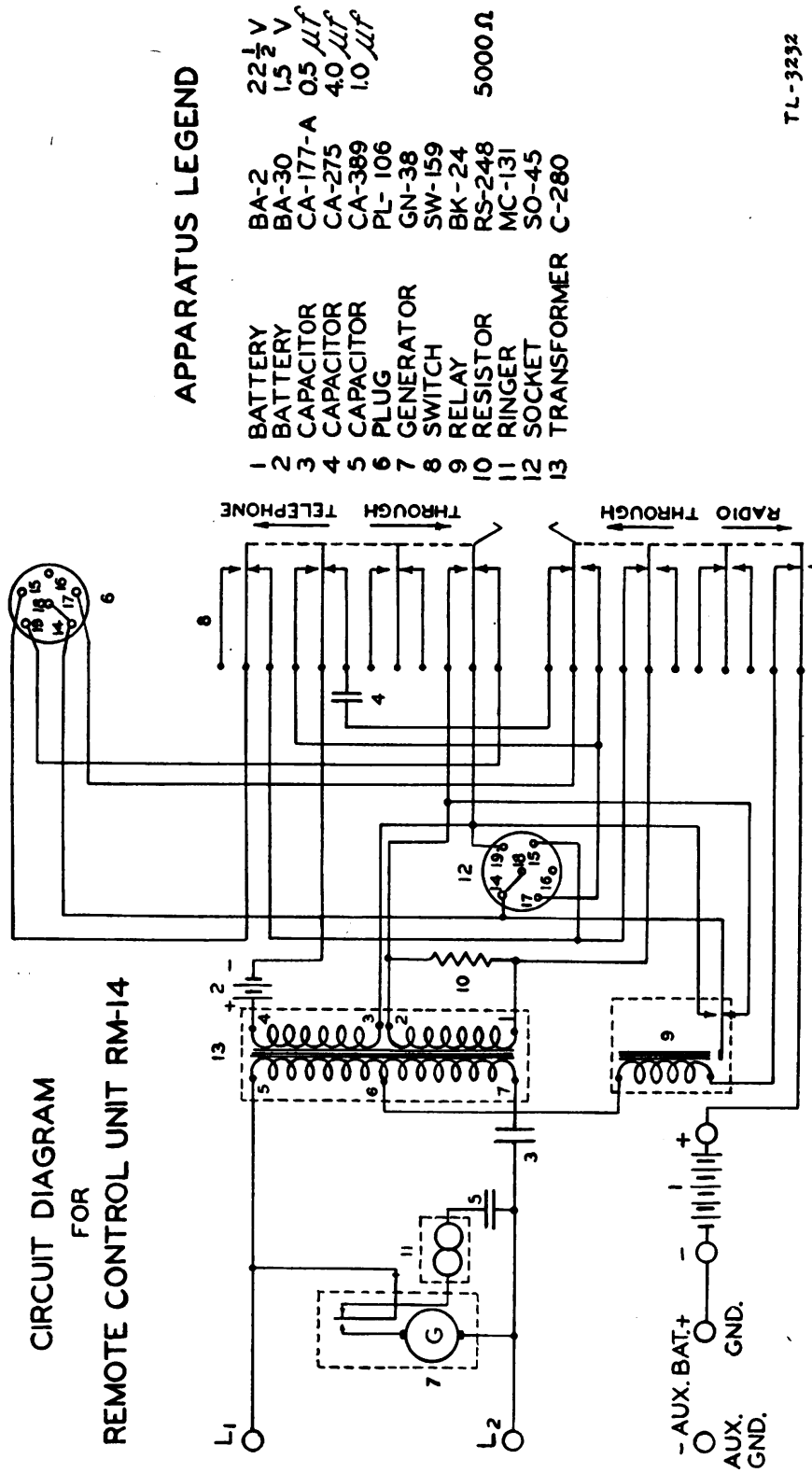


FIGURE 31.—Remote control unit RM–14—circuit diagram.

NOTE.—Microphones T–24–A, T–24–B, T–24–C, T–24–D, T–24–E, and T–24–F are interchangeable. Handsets TS–11–A, TS–11–B, TS–11–C, TS–11–D, TS–11–E, and TS–11–F are interchangeable.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

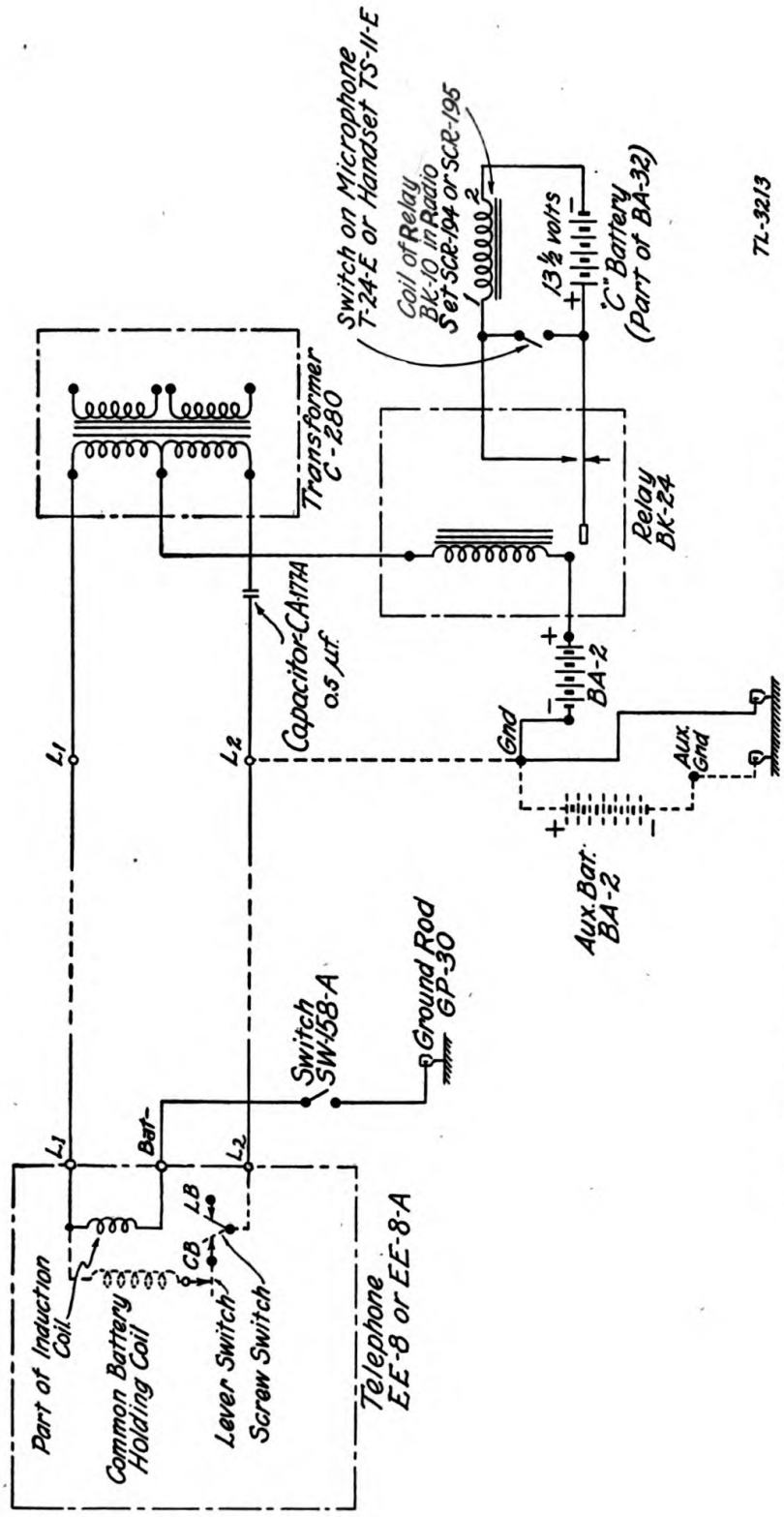


FIGURE 32.—Functional diagram, switching circuits switch in THROUGH position.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

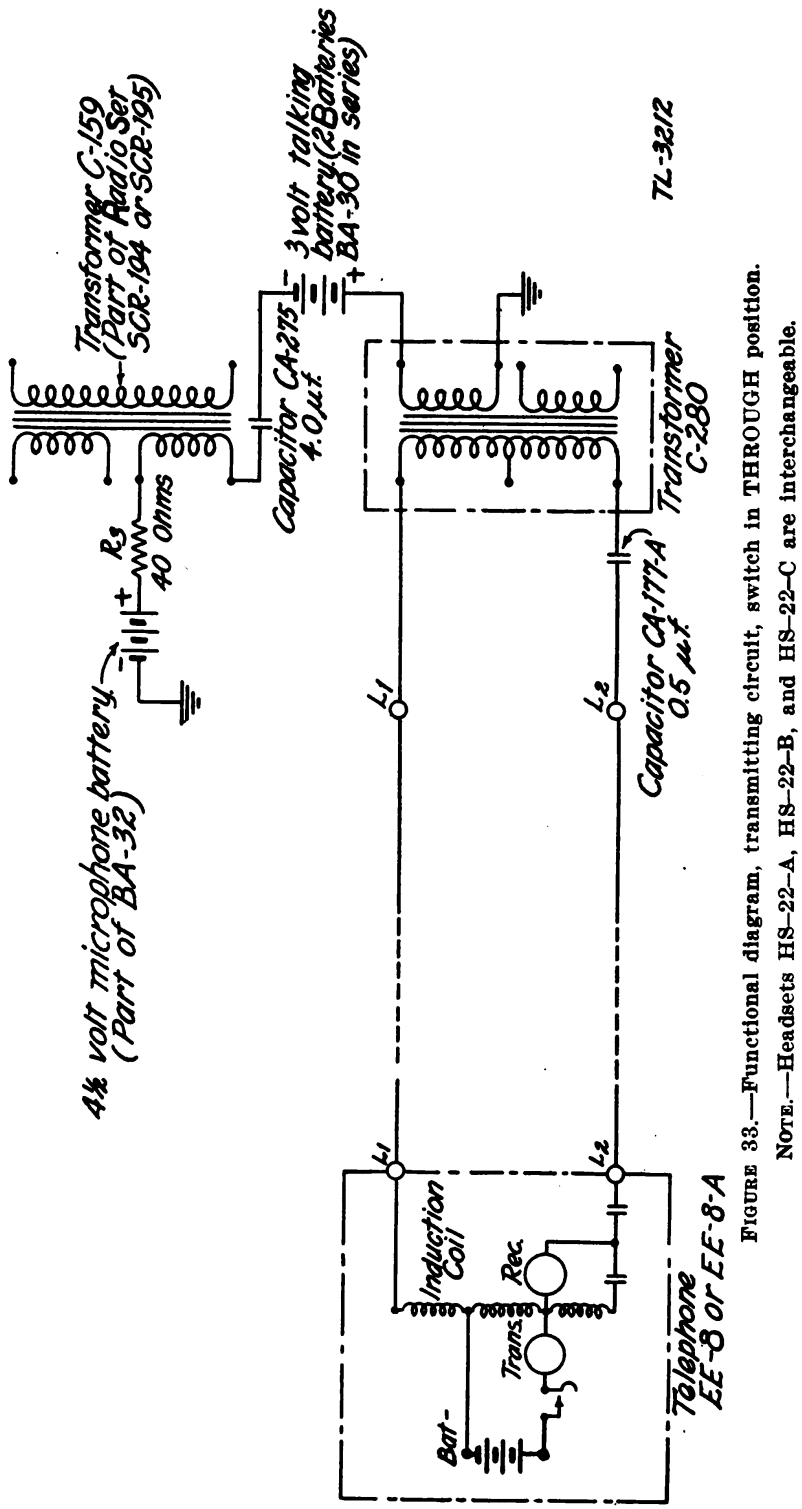


FIGURE 33.—Functional diagram, transmitting circuit, switch in THROUGH position.

NOTE.—Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable.

Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA

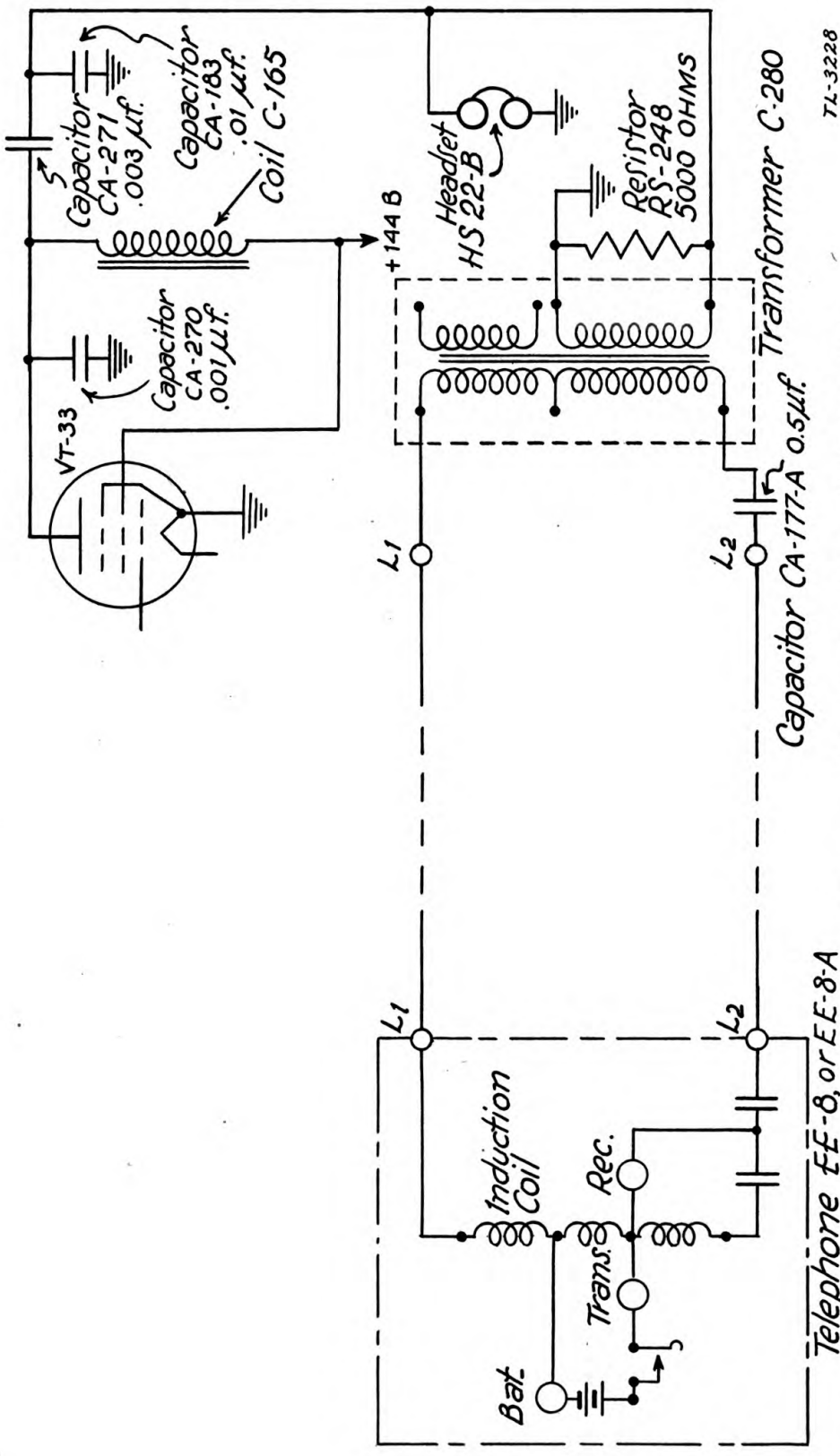


FIGURE 34.—Functional diagram, receiving circuit, switch in THROUGH position.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

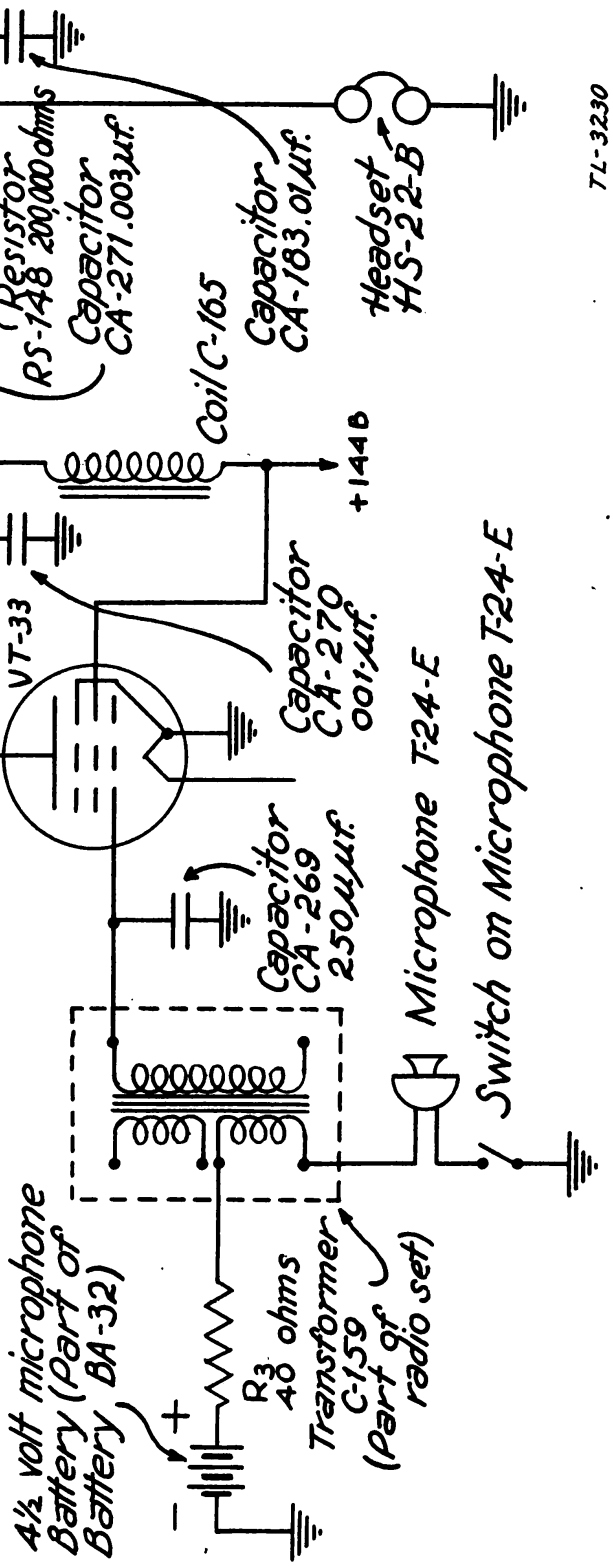


FIGURE 35.—Functional diagram, transmitting circuit, switch in RADIO position.

NOTE.—Microphones T–24–A, T–24–B, T–24–C, T–24–D, T–24–E, and T–24–F are interchangeable. Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

set are in the circuit, they have no effect on the talking current since capacitor CA–275 is also in the circuit. The 3-position switch must be in the THROUGH position.

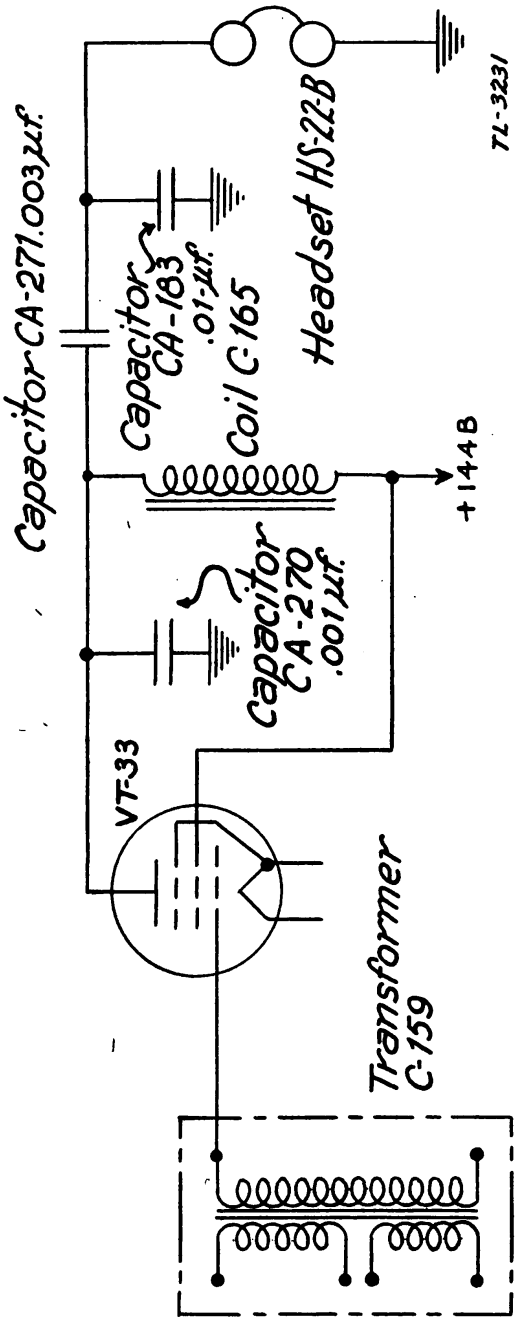


FIGURE 36.—Functional diagram, receiving circuit, switch in RADIO position.

NOTE.—Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable.

d. Reception.—Figure 34 shows the path of the voice currents when receiving. The output of the amplifier tube VT–33 is fed into the telephone line through capacitor C–10 and transformer C–280. The radio operator's headset (or receiver) is also connected to the output

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

circuit of the radio set. The microphone, except for the control switch, is not connected. For simplicity, various parts such as the 3-position switch, which must be in the THROUGH position, have been omitted.

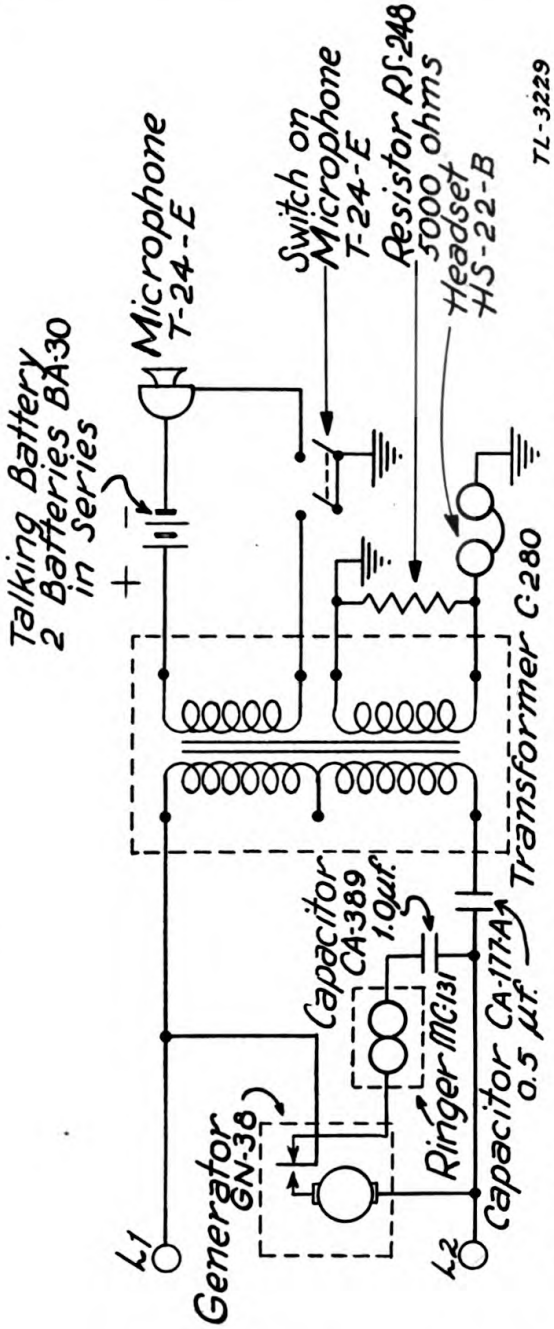


FIGURE 37.—Functional diagram, ringing, talking, and listening circuits, switch in TELEPHONE position.

NOTE.—Microphones T–24–A, T–24–B, T–24–C, T–24–D, T–24–E, and T–24–F are interchangeable. Headsets HS–22–A, HS–22–B, and HS–22–C are interchangeable.

e. Radio operation.—Figures 35 and 36 show the transmitting and receiving circuits which are completed by moving the 3-position switch to the RADIO position. It can be seen by comparison with figures 24 and 25 that the same components are used in this method

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

of operation as are used in communication without the remote control equipment. Only the audio-frequency portions of the circuit are shown. Switching is accomplished by means of the button on microphone T–24–E (or on handset TS–11–E if used) in the same manner as described in paragraph 4*a*.

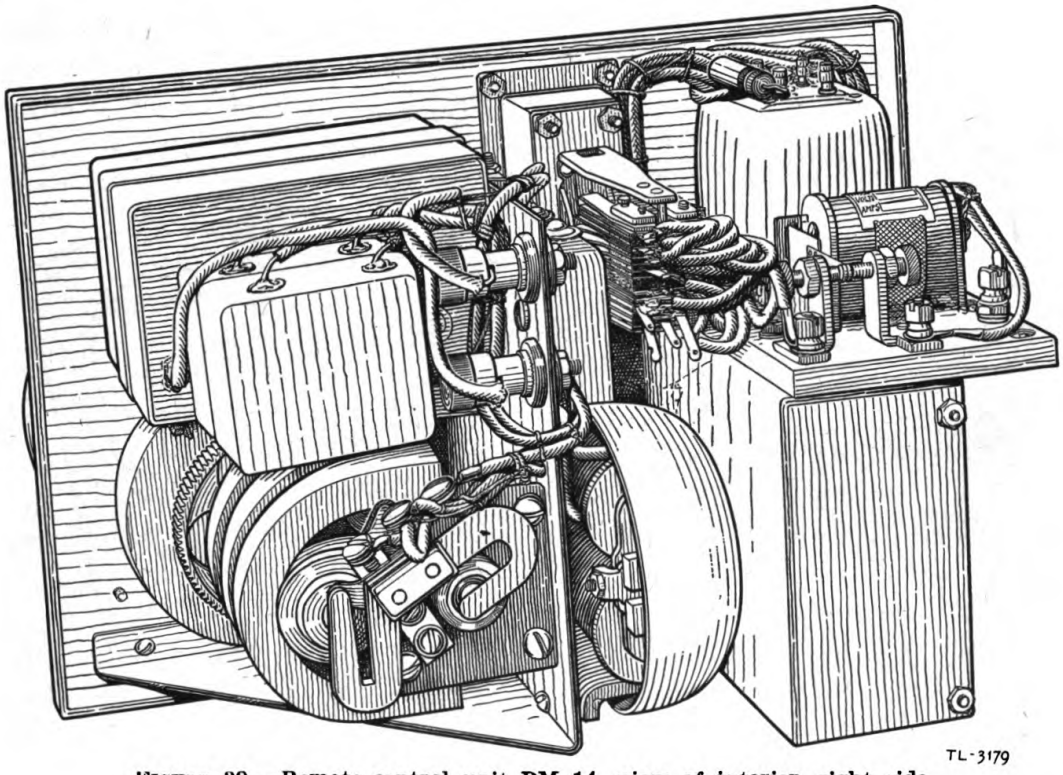


FIGURE 39.—Remote control unit RM–14, view of interior, right side.

f. Telephone operation.—Figure 37 shows the circuits which are completed by moving the 3-position switch to the TELEPHONE position. The ringer MC–131 and generator GN–38 remain across the line as shown regardless of the position of the switch. It can be seen from figure 37 that the circuit is similar to that of a telephone EE–8 or EE–8–A. The locations of the various parts which comprise the remote control unit RM–14 can be seen in figures 38 and 39.

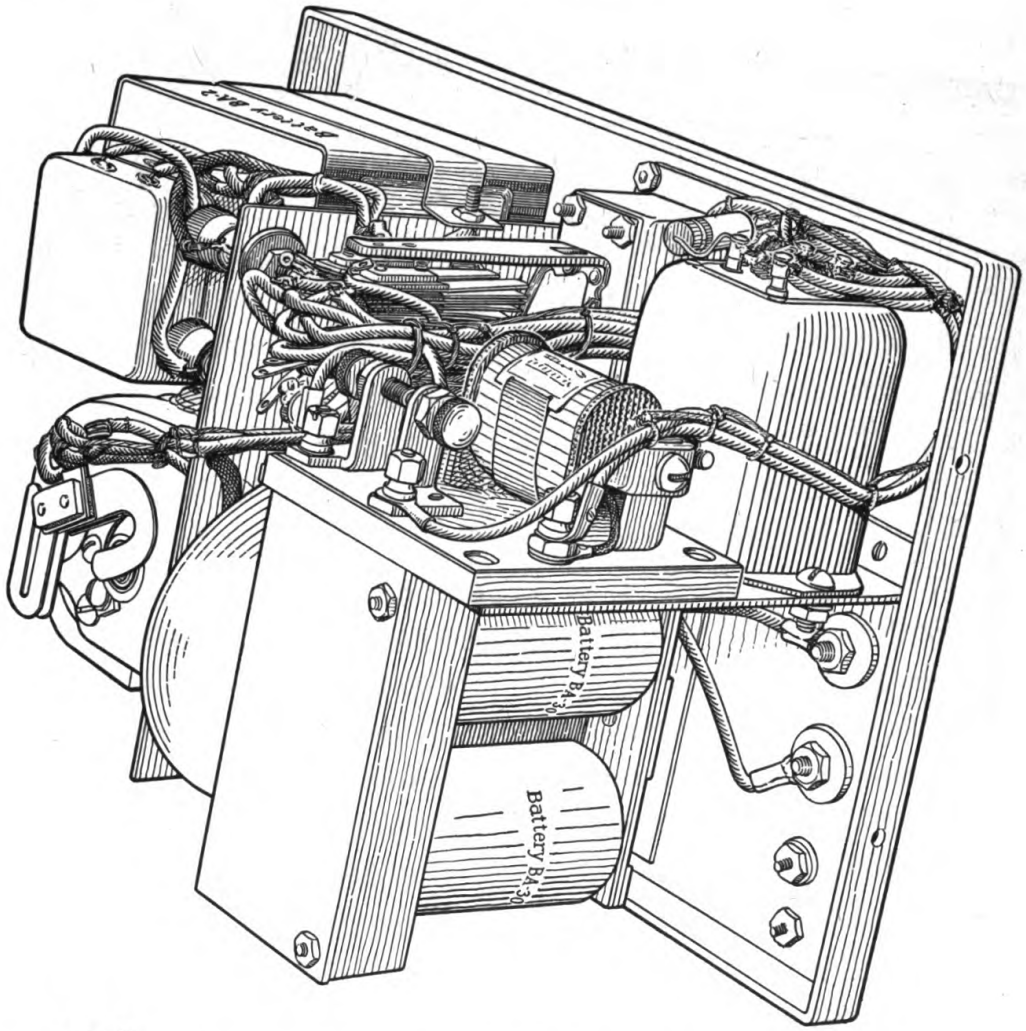
22. Parts list.—The following items comprise the remote control equipment RC–66:

Quantity	*Article*
2	Battery BA–2; 1 in use, 1 spare
4	Battery BA–30; 2 in use, 2 spare
2	Book, instruction, for remote control unit RM–14
1	Case CS–76–A
4	Ground rod GP–30

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Quantity	*Article*
1	Remote control unit RM–14
3	Switch SW–158–A

NOTE.—Wire W–110–B or other type furnished to the organization for telephone purposes is used to connect the units together.



TL-3178

FIGURE 38.—Remote control unit RM–14, view of interior, left side.

SECTION VI

ANTENNA EQUIPMENT RC–63

	Paragraph
Purpose	23
Setting up and connecting	24
Operating	25
Removing from service	26
Parts list	27

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

23. Purpose.—The antenna equipment RC-63 is used with, but is not part of, radio sets SCR-194 and SCR-195. When dismantled and packed in bag BG-93 for shipment, the equipment is 8 feet by 1 foot by 8 inches, and weighs 57 pounds. It can be carried over short distances by one man. It provides a means for increasing the range of the radio sets (see par. 25). The antenna consists of a 100-foot antenna wire erected over a single 30-foot mast and an 85-foot counterpoise wire laid along the ground. The antenna and counterpoise are terminated in a 500-ohm resistor unit. The mast consists of four 8-foot sections of 1⅝-inch wooden rod with metal ferrules. The mast is so designed that it may easily be erected by one man. The upper half of the mast is hoisted into position by means of a rope and pulley. The lower half is supported by three guy ropes.

24. Setting up and connecting.—The antenna should be erected whenever possible in a cleared location so that the mast and antenna wire will be free of interference by trees and shrubbery. The best results will be obtained if the antenna can be erected in a high location.

a. Base lay-out (fig. 40).—With the spot where the mast is to stand for a center, drive three stakes GP-2 into the ground in the form of a triangle, each one approximately 22 feet from the center.

b. Mast, guy rope, and antenna assembly (fig. 41).—(1) The mast consists of four sections which have been designated as mast sections MS-91, MS-92, MS-93, and MS-94, beginning with the top section. Assemble the four sections of the mast on the ground as indicated in figure 41④. Connect the three guys GY-34 to the three ears in the metal collar on the top of mast section MS-93 by means of the hooks provided and adjust the guys to approximately their correct length. Fasten two of the guys GY-34 to two of the ground stakes making at least one complete turn of rope around each stake to prevent the rope from slipping (see fig. 41③). Fasten the pulley provided with the hoisting rope (guy GY-35) to the eye in the metal collar on the top of mast section MS-93 with the hook provided. Fasten the hook on one end of the hoisting rope to the eye in the metal collar on the bottom of mast section M-92. Connect the loop in the center of the antenna AN-36 to the eye on the cap on the top of mast section MS-91 by means of the hook provided. With the mast fully collapsed, that is, with mast sections MS-91 and MS-92 lying parallel to mast sections MS-93 and MS-94, raise the mast into position and secure the third guy rope to its stake in the same manner as the other two. Adjust all guy ropes so that the mast is vertical. Now, hoist the two top sections into place with the hoisting rope, and secure the free end of the hoisting rope to one of the guy stakes in the same manner as the guy ropes.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

(2) Stretch out one-half of the antenna AN–36 from the mast in the direction of transmission. One end of the counterpoise (antenna AN–37) is terminated in a clip and the other in a bare wire. Pass a stake through the hook fastened to the loop in the end of antenna AN–36 and also through the hook fastened to the loop in the end

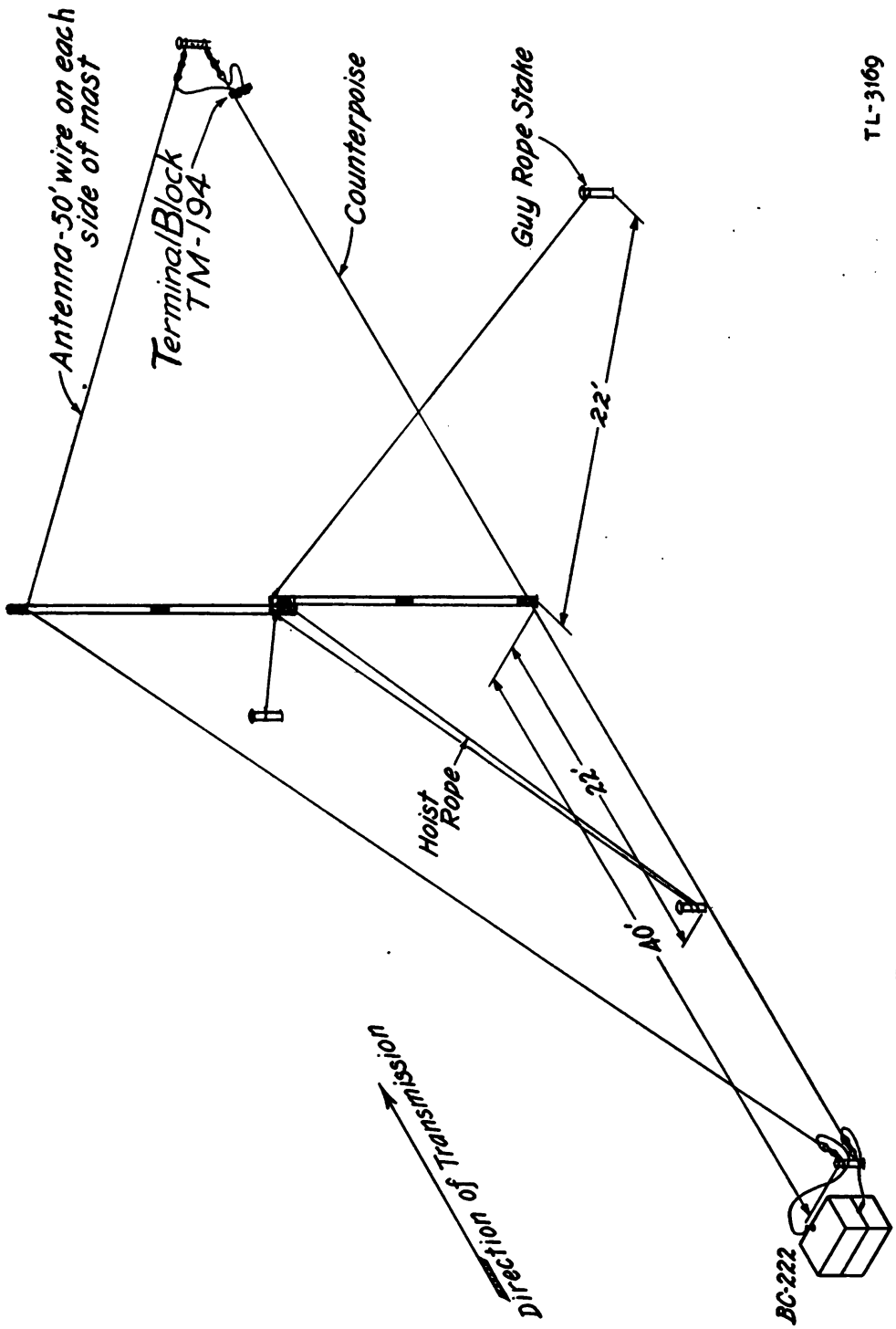


FIGURE 40.—Antenna equipment RC–63 set up for operation.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

of the counterpoise (antenna AN-37) which is terminated in a bare wire (see fig. 41②). Take up the slack in antenna AN-36 and drive the stake into the ground. Avoid pulling the antenna wire tight, since this will bend the mast excessively. Slide terminal block TM-194, which is part of antenna AN-37, along the counterpoise wire toward the stake just driver, and connect antenna AN-36 to the binding post marked ANT, and the counterpoise (antenna AN-37)

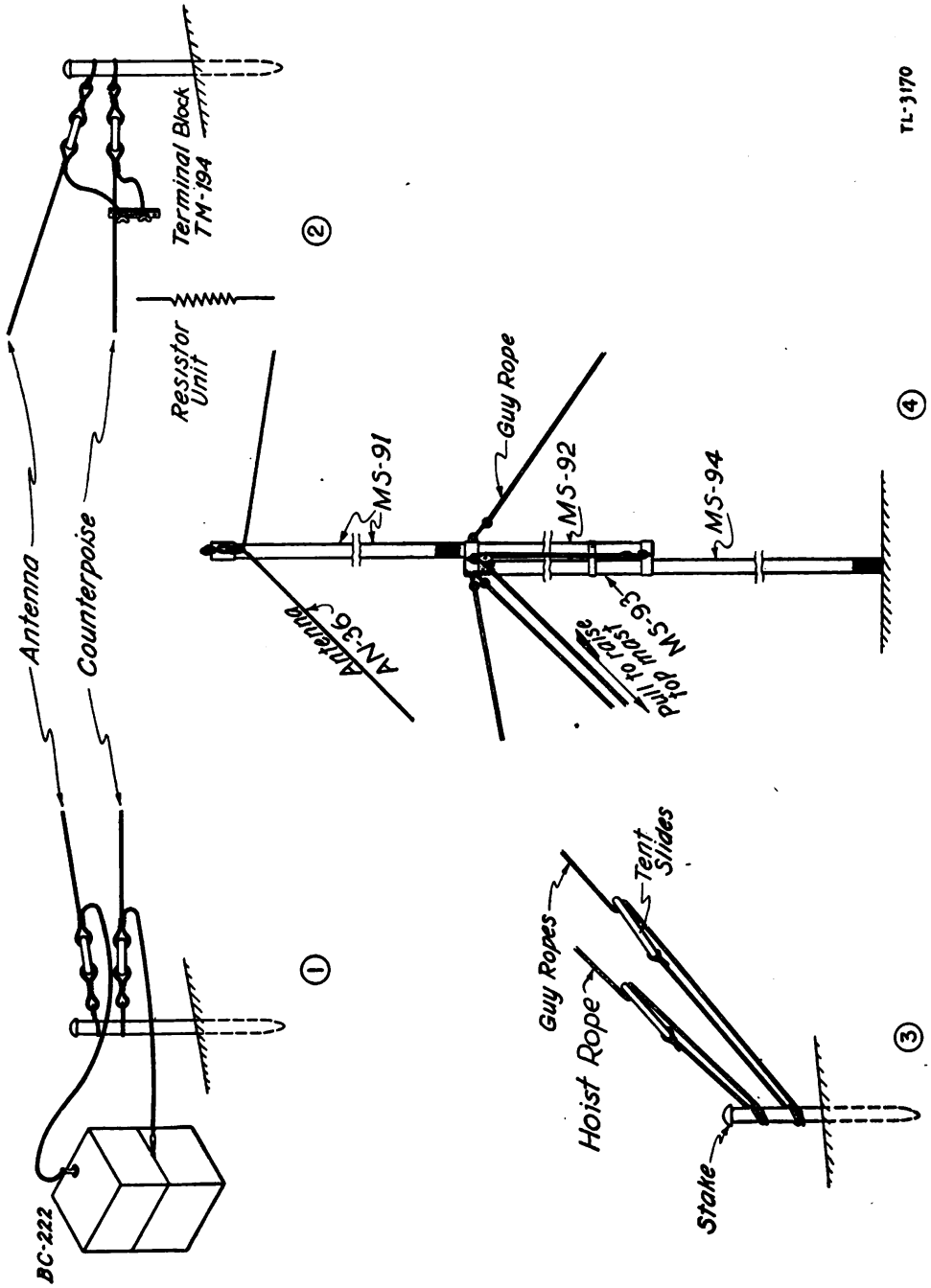


FIGURE 41.—Antenna equipment RC-63, details.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

to the post marked CPSE. Terminal block TM–194 contains a 500-ohm terminating resistor. Stretch the other half of the antenna wire in the opposite direction from the mast, and lay out the counterpoise on the ground below antenna AN–36. Pass a stake GP–2 through the hook fastened to the loop on the end of antenna AN–36, and also through the hook fastened to the loop of the counterpoise (see fig. 41①). Pull the antenna tight and drive the stake into the ground. Make sure that this stake is in line with the bottom of the mast and the stake on the other end of the antenna. Using a binding post TM–176, connect the radio receiver and transmitter BC–222 or BC–322 to the end of the antenna wire. Connect the counterpoise to the case of the radio set by means of the clip on the end of the counterpoise.

25. Operating.—The operation of radio set SCR–194 or SCR–195 is the same with the antenna equipment RC–63 as with the antenna AN–29 or AN–30. Care must be taken, however, that the end of the antenna which is terminated in the terminal block TM–194 is directed accurately toward the station with which communication is desired, because the antenna has great directivity, particularly on the higher frequency channels. The amount of gain provided by the rhombic antenna over the vertical antenna provided with the radio sets varies somewhat with frequency and terrain. In general, the gain to be expected will be of the order of one point on the readability scale (see par. 41, TM 11–454), that is, a poor but readable signal will be made fairly readable. In other directions, a corresponding *decrease* in readability will be obtained, the amount of decrease depending upon the position of the remote station. Maximum decrease in readability is obtained in the direction opposite to that for maximum increase.

26. Removing from service.—The antenna equipment RC–63 is removed from service in the reverse order from the procedure followed in setting up.

a. Disconnect the radio receiver and transmitter BC–222 or BC–322 from the antenna and counterpoise, and pull the stake nearest the set.

b. Starting with the free end, wind the counterpoise wire on a reel RL–3, leaving the terminal block TM–194 on the outside end of the wire. Disconnect the antenna and counterpoise from the terminal block, and pull the stake on this end.

c. Loosen the hoisting rope from the stake to which it is fastened, and lower the top half of the mast. Unfasten one guy rope from its stake, and lower the mast. Disconnect the antenna from the top of the mast.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

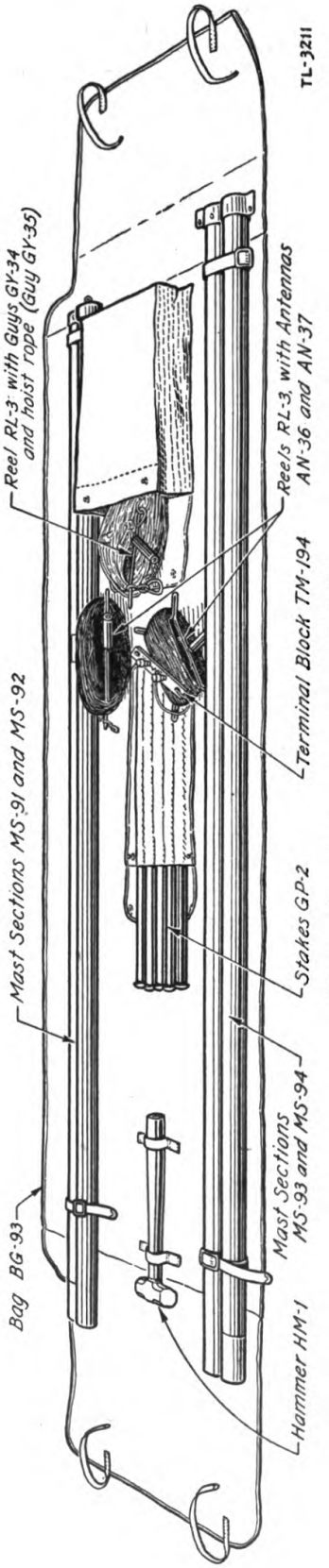


FIGURE 42.—Antenna equipment RC-63.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Caution: Do not allow the mast to drop freely, since this may damage the mast section fittings or break the wood mast sections.

d. Wind the antenna wire on another reel RL-3 and place the two full reels in the large pocket of bag BG-93 (see fig. 42).

e. Unfasten all guy ropes and hoisting rope from stakes and from the collar on mast section MS-93, and wind all ropes on the other reel RL-3 provided, beginning with the hoisting rope (guy GY-35). This reel also fits into the large pocket in bag BG-93.

f. Separate the four mast sections and fasten them into bag BG-93 by means of the four straps provided in the bag.

g. Place all stakes into the compartments of the center pocket of bag BG-93, and fasten the cover of the pocket with the two fasteners on the cover.

h. Slide the handle of hammer HM-1 into the loops provided for the purpose, placing the head of the hammer toward the end of the bag. Place spare parts, if any, in the pocket with the two reels, and close the cover of the pocket with the two fasteners provided.

i. Fold the ends of the bag BG-93 over the equipment, and fasten the two straps on each end to the buckles sewed on the inside of the bag.

j. Starting with the side opposite the 6-inch flap, roll up the bag and fasten with the three straps and buckles provided.

27. Parts list.—The following items comprise the antenna equipment RC-63:

Quantity	*Article*
1	Bag BG-93
1	Mast section MS-91
1	Mast section MS-92
1	Mast section MS-93
1	Mast section MS-94
1	Antenna AN-36
1	Antenna AN-37 (used as counterpoise)
5	Stake GP-2
3	Guy GY-34
1	Guy GY-35
3	Reel RL-3
1	Hammer HM-1

SECTION VII

CARRIER FM-32 AND FRAME FM-33

	Paragraph
Purpose	28
Description	29
Employment	30

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

28. Purpose.—The carrier FM-32 and the frame FM-33 are intended for pack transport of radio set SCR-194 and other equipment for pack artillery. They consist of metal frames provided with devices for attaching to a cargo type Phillips pack saddle. The carriers FM-32 are ordinarily used in pairs, one on each side of the pack

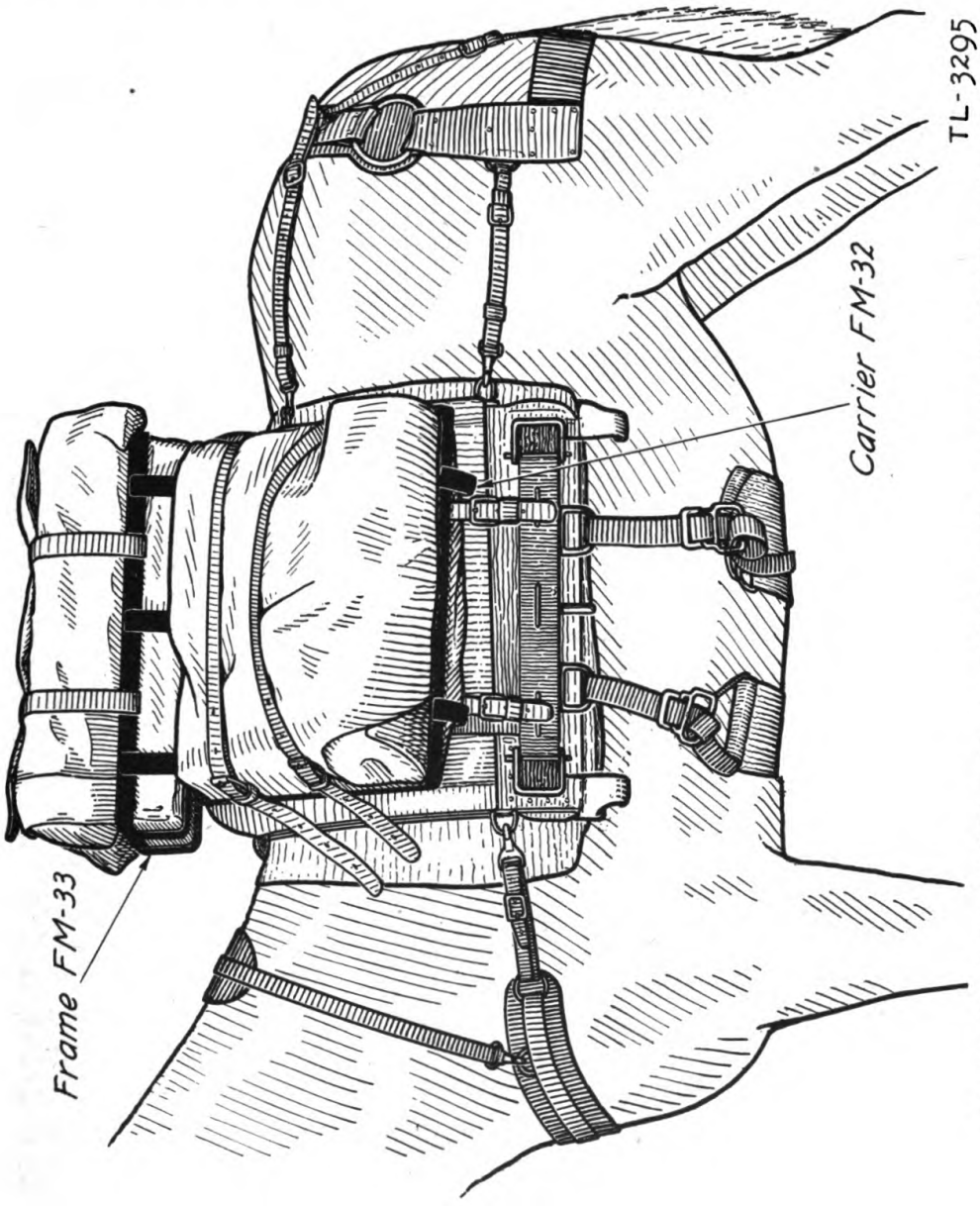


FIGURE 43.—Carrier FM-32 and Frame FM-33 attached to cargo type Phillips pack saddle.

saddle, and may or may not be used in conjunction with the frame FM-33. The frame FM-33 is for top loading (see fig. 43).

29. Description.—*a. Carrier FM-32.*—The carrier FM-32 is 20 7/8 inches wide, 3 3/16 inches deep, and 22 inches high, including hooks. Its weight is 9 pounds. It is constructed of six hot-rolled steel parts,

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

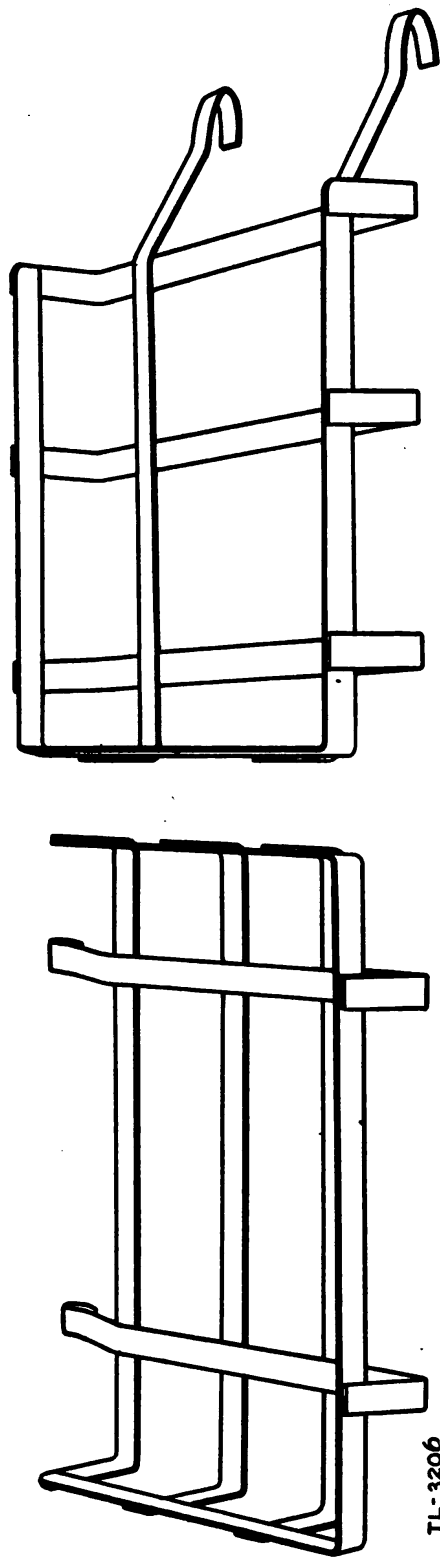


FIGURE 44.—Carrier FM-32.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

welded together. Two pieces, which form part of the back structure of the carrier, are extended and bent into the shape of hooks, which fit over one of the two metal bars along the top of the Phillips pack saddle (see fig. 44). The straps and covers which are ordinarily used with the carrier FM–32 are items of quartermaster issue and must be obtained separately. The arches and bolts for attaching to the pack saddle are ordnance issue.

b. Frame FM–33.—The frame FM–33 is 22¾ inches long, 17¼ inches wide, and 4¼ inches deep, exclusive of mounting feet. Its weight is 12 pounds. It is constructed of 10 hot-rolled steel parts, including mounting feet, welded together. Four bolts, with nuts, washers, and cotter pins, are provided for attaching the frame FM–33 to the top of the frame of the Phillips pack saddle (see fig. 45). The straps and manta (cover) which are ordinarily used with the frame FM–33 are items of quartermaster issue and must be obtained separately. The arches and bolts for attaching to the pack saddles are ordnance issue.

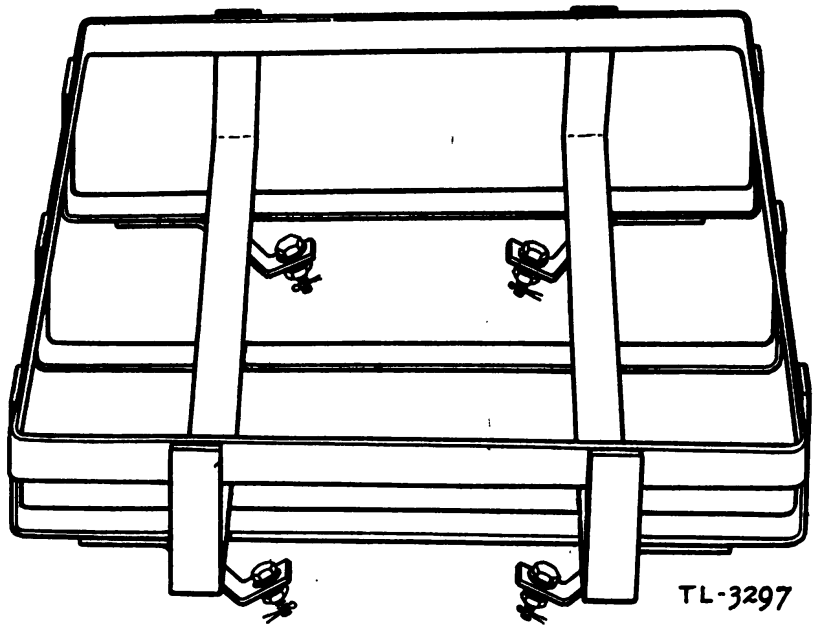


FIGURE 45.—Frame FM–33.

30. Employment.—*a. Use in pack equipments.*—There is no fixed rule for the employment of either the carrier FM–32 or the frame FM–33. Both are used to carry parts of radio set SCR–194 in various pack equipments, such as the pack equipment CE–6 (also known as pack, radio, No. 1), pack equipment CE–7 (also known as pack, radio, No. 2), pack equipment CE–9 (pack, radio, No. 4) and pack equipment CE–10 (pack, radio, No. 5). The pack equipments CE–6, CE–7, CE–9 and CE–10, are not furnished as such by

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

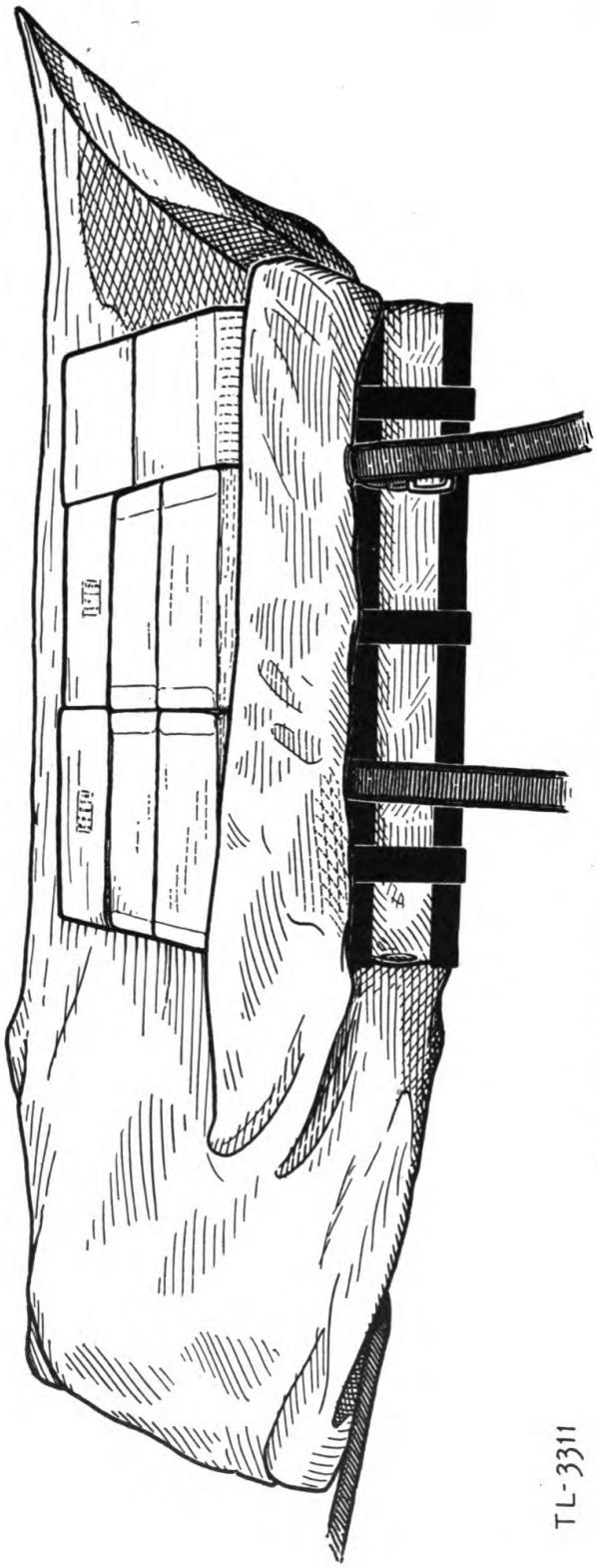


FIGURE 46.—Frame FM-33, method of packing 8 batteries BA-32.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

the Signal Corps but are arbitrary groupings used by the pack Field Artillery for transportation purposes. (See T/BA No. 6–3, appendix, for details.)

b. Loading.—The usual method of loading the carrier FM–32 is as follows:

(1) Place the carrier on the ground, with the open side up.

(2) Cover the carrier with a pack cover (manta), unfolded, so that the cover extends approximately equally beyond the carrier on all four sides.

(3) Place the equipment to be loaded into the carrier, at the same time pushing the cover well down into the carrier.

(4) Fold the pack cover over the equipment, making additional folds if necessary to take care of any surplus material.

(5) Pass two or more straps over the top of the equipment and under the top bar on each side of the carrier; pull the straps tight and fasten with the strap buckles.

(6) Lift the loaded carrier, and hang on one of the two metal bars along the top of the Phillips pack saddle by means of the hooks on the carrier.

(7) Fasten the bottom of the carrier to the bottom of the frame of the saddle by means of straps, as shown in figure 43.

The total load carried in the two carriers FM–32 should be so divided that an equal weight is carried on each side of the pack animal. The frame FM–33 is loaded in a similar manner to the above. After loading, the frame is placed on the top of the Phillips pack saddle, and the four bolts provided are passed through the holes in the mounting feet of the frame and through the holes in the top of the frame of the saddle. The washers and nuts are then placed on the bolts and the nuts tightened. The cotter pins provided are then passed through the holes in the bolts and bent over to prevent loosening of the nuts.

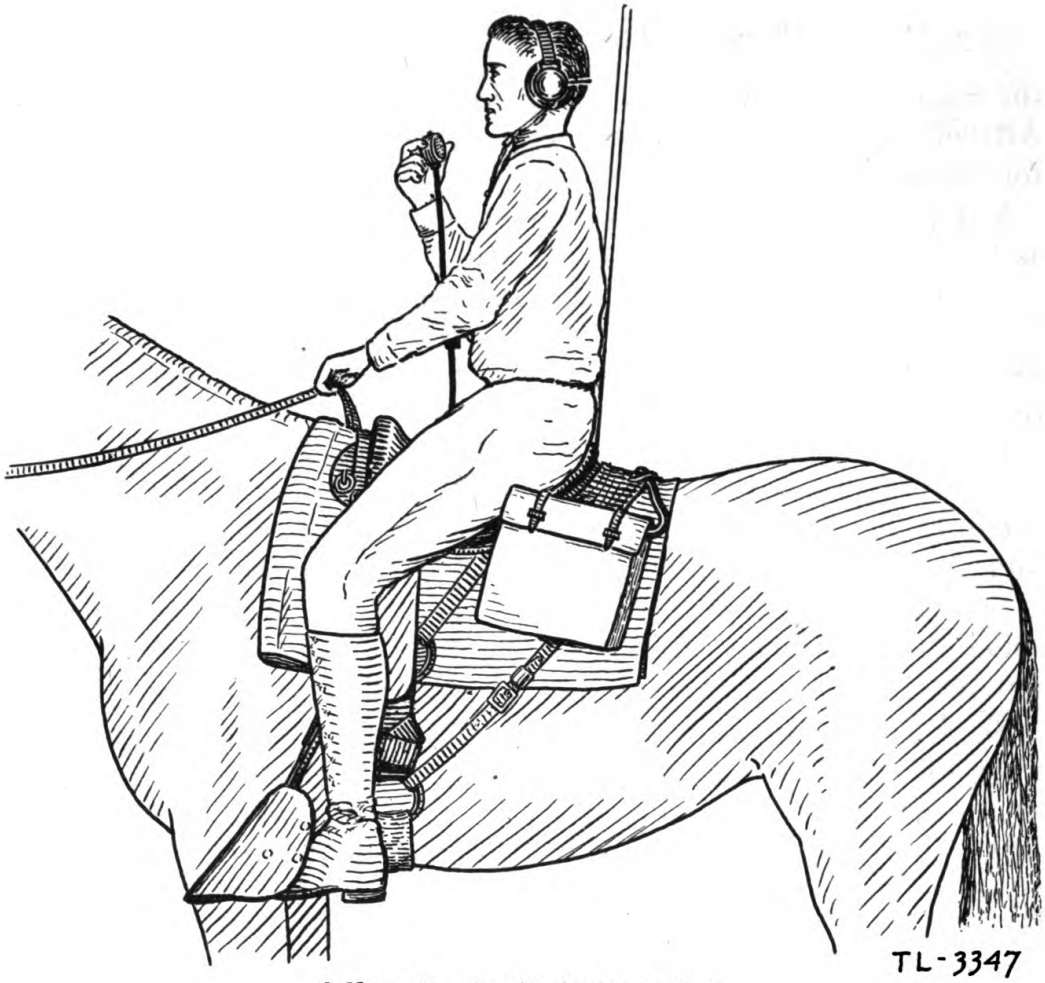
SECTION VIII

BAG BG–82

Paragraph
Purpose 31
Description 32
Employment 33

31. Purpose.—The bag BG–82 provides a means for operation of the radio set SCR–194 by a mounted operator. It is so arranged that the weight is carried by the horse rather than the operator. It consists of two leather pockets connected together by a leather yoke. The yoke fits over the cantle of the McClellan saddle, and one of

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA



① Near side, showing battery pocket.

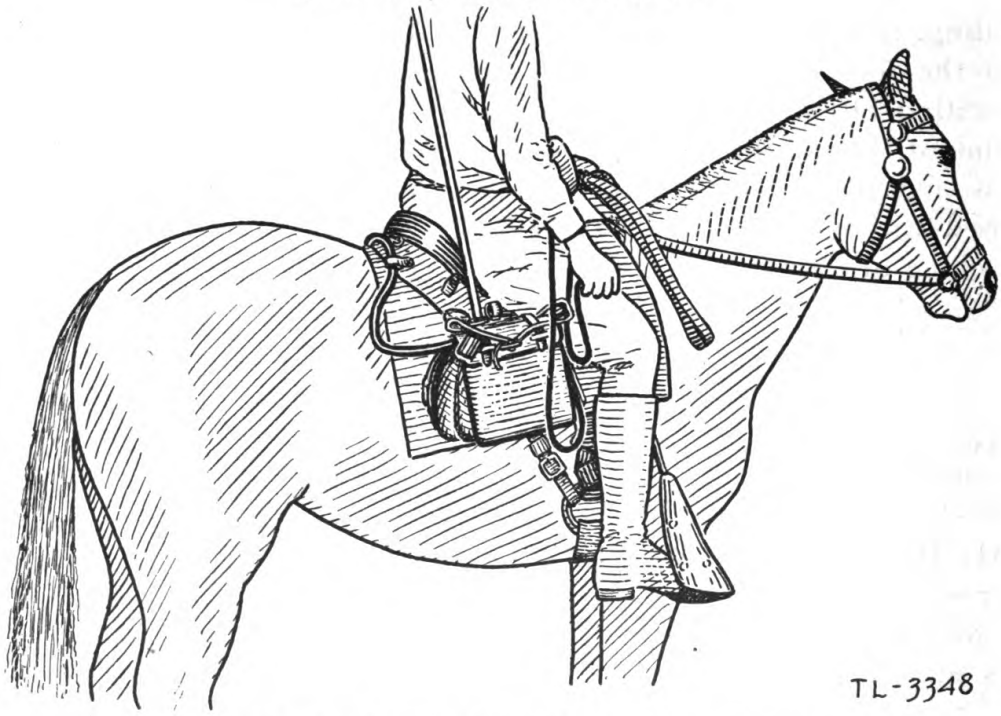


FIGURE 47.—Bag BG–82. ② Off side, showing radio pocket.

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

the bags fits on each side. The weight of the bag BG-82 with its included adapter FT-236 (battery) is 11 pounds.

32. Description.—The pocket on the near side carries the battery BA-32 (fig. 47①), and the pocket on the off side carries the radio receiver and transmitter BC-222 (fig. 47②). A hole with a removable leather cap is provided in the top of the radio pocket for the antenna AN-29-B. An adapter FT-236 for battery connection, with a plug in one end and a socket in the other, passes between the two pockets, and is held in place by snap fasteners. An opening with a cover flap in the side of the radio pocket is provided to make the radio set controls accessible. A leather fitting is provided on the top of the radio pocket for carrying the antenna when not in use. A small pocket on the side of the radio pocket opposite the control opening is provided for storage of the microphone T-24-E and the headset HS-22-B. Both the radio pocket and the battery pocket are padded inside with felt, and the battery pocket is fitted with a strap to facilitate removal of the battery. D-rings are provided on the bottoms of the two pockets, with straps, which are fastened to the cinch to prevent them from bouncing.

33. Employment.—The operation of the radio set SCR-194 when installed in bag BG-82 is the same as when worn as a pack on the back of the operator. The antenna AN-29-B may be used extended to the proper length for the coil used (see par. 6), with good results if the terrain to be traveled is open, and offers no obstruction such as trees or low wires with which the antenna may come in contact. Usually, however, it will be necessary to use the antenna collapsed. The range of the radio set SCR-194 when used in this manner will depend upon the terrain and the frequency, as well as the amount of antenna used. In most cases, it will be somewhat less than when the set is operated as a fixed station with extended antenna.

[A. G. 062.11 (3-3-42).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

J. A. ULIO,
Major General,
The Adjutant General.

DISTRIBUTION:

R and H 6, 7 (3); IBn 6, 7 (5); IC 11 (5).
(For explanation of symbols see FM 21-6.)

U. S. GOVERNMENT PRINTING OFFICE: 1942

Digitized by Google
Original from UNIVERSITY OF CALIFORNIA

Digitized by Google

Original from
UNIVERSITY OF CALIFORNIA

Digitized by Google
Original from
UNIVERSITY OF CALIFORNIA